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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

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SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Condensation Trails

(*For complete table of contents see back cover*)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains from 100 to 200 abstracts of current periodical literature and monographs in the fields of meteorology, hydrology, oceanography, etc. These abstracts are arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of from 50 to 250 important references on a special subject without respect to recency of material. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject. Preference is given to recent material, comprehensive works, material from obscure sources, and items with good bibliographies.

Vol. 1, No. 1–11, Jan.–Nov. 1950 carried the following bibliographies: *Atmospheric Pollution, Aerobiology, Cloud Physics and "Rainmaking," Hail, Tornadoes, Volcanic Dust, Climatic Changes, Thunderstorms, Icing, Acoustical Propagation* and *Evaporation.*

Bibliographies published this year were:

1. **Extended Forecasting,** Vol. 2, No. 1, Jan. 1951.
2. **Long Range Forecasting,** Vol. 2, No. 2, Feb. 1951.
3. **Soil Temperature,** Vol. 2, No. 3, March 1951.
4. **Constants, Units, Tables and Diagrams,** Vol. 2, No. 4, April 1951.
5. **Climate of the Near East,** Vol. 2, No. 5, May 1951.
6. **Climate of the Middle East,** Vol. 2, No. 6, June 1951.
7. **Special Winds,** Vol. 2, No. 7, July 1951.
8. **Radar Storm Detection,** Vol. 2, No. 8, Aug. 1951.
9. **Condensation Trails,** Vol. 2, No. 9, Sept. 1951.

Forthcoming bibliographies will be:

10. **Climate of Northeast Africa,** Vol. 2, No. 10, Oct. 1951.
11. **Mountain Meteorology,** Vol. 2, No. 11, Nov. 1951.
12. None. (Entire issue will be **Cumulative Indexes.**)

Other bibliographies in preparation are:

Actinometers
Carbon Dioxide in the Atmosphere
Climate and Cancer
Climate of Central Africa
Climate of Northwest Africa
Climate of Southeast Asia
Climate of the East Indies
Climatology of South America
Dew
Frost and Frost Forecasting
Machine Methods in Meteorology
Microwave Transmission
Objective Forecasting
Oceanographic Meteorology
Ozone
Stratus Forecasting
Turbulence
Urban Climatology

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the June and December issues cumulative indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used in this issue may be found in the following list:

DAWS:	U. S. Air Weather Service Technical Files, Washington 25, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.
NJP:	Princeton University Library, Princeton, N. J.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5–6):146–151, May–June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5–6 (No. 5 and 6), *pages* 146–151, May–June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL METEOROLOGY

2.9–1 551.5:01

Hawkins, Reginald Robert (ed.), **Scientific, medical, and technical books published in the United States of America.** Washington, D. C., National Research Council, **1950.** 514 p. **DLC**—Section on Meteorology p. 43–45. Section on Oceanography p. 78–79. A selected list of 14 books now in print, with annotations, including those written by BERRY, BLAIR, CLAYTON, DONN, FULTZ, GARBELL, HAYNES, HOLMBOE, MONTGOMERY, NEUBERGER, TANNEHILL (*Drought and Hurricanes*), THIESSEN (glossary) and WIELD. *Subject Headings:* **Meteorology, Bibliographies.**—*M.R.*

2.9–2 551.5:06(92)

Braak, C., Boerema, J. and Berlage, H. P., Jr., **Meteorologie en klimatologie. I. Tot 1296 (*sic*). II. Van 1926 tot aan de oorlog in de Pacific. III. Na de oorlog in de Pacific, de Meteorologische en Geophysische Dienst.** [Meteorology and climatology. I. Up to 1926 (by Dr. Braak). II. From 1926 to the war in the Pacific (by Dr. Boerema). III. After the war in the Pacific; the Meteorological and Geophysical Service.] *Chronica Naturae*, Djakarta-Pusat, 106(5):207–215, May **1950. DLC**—A review of the history of meteorological observations, publications and weather service as it was developed in the Netherlands Indies, beginning with the earliest mention of monsoons in East India (Valentijn, 1724) down to the second world war and the present organization as it has been constituted since the war; especially the measures taken to bring the service in line with IMO resolutions made at Toronto and Washington (1947) and regional conferences since. *Subject Headings:* **Meteorological services, History of meteorology, Indonesia.**—*M.R.*

2.9–3 551.5:06(569.4)

Israel. Meteorological Service, **Series A, Meteorological Notes.** Dir.: M. Gilead. First issue No. 1, 1951. Latest issue received, No. 2, **1951.** In English and Hebrew. **DWB**—A new series, commencing in 1951, "to serve as a means of expressing conclusions at which members of the meteorological staff have arrived in the course of their work. . . . Many of the problems are connected with the efforts to utilize all available resources in this semi-arid country confronted with the task of absorption and settlement of large scale immigration." *Subject Headings:* **Meteorological services, Israel.**—*C.E.P.B.*

2.9–4 551.5:06(73)

Lieurance, N. A., **Meteorology services universally available.** *Institute of Navigation, Journal, Supplement*, 2(8), Dec. **1950.** 6 leaves. (Symposium papers delivered at the joint ION-RTCA-RTCM Meeting, New York, Sept. 19–21, 1950.) **DWB**—A survey of history and functions of the U. S. Weather Bureau in general and of the aviation, marine and climatological services in particular, with reference to the ways in which these services aid navigation (sea and air). Some of the most important publications of the U. S. Weather Bureau, which might interest navigation, are listed. *Subject Headings:* **Meteorological services, U. S. Weather Bureau.**—*M.R.*

2.9–5 551.5:621.311(748)

Stephens, F. Briscoe, **A method of analyzing weather effects on electrical power consumption.** *American Meteorological Society, Bulletin*, 32(1):16–20, Jan. **1951.** 4 figs., 2 tables, 3 refs. **MH-BH**—After major effects on power consumption (such as seasonal, weekly or

diurnal variations and changing economic or social factors) are discovered and eliminated from time series, it is possible to evaluate the effects of such weather elements as cloudiness on power load. If this factor is then removed from the data, other weather factors can more easily be evaluated. Data for State College, Pennsylvania, for 1947 was used in this statistical study. *Subject Headings:* **Industrial meteorology, Power consumption, State College, Pennsylvania.**—*M.R.*

2.9–6 551.5:63(415)

*Nolan, P. Ryan and Pollak, Leo Wenzel, **On the prediction of the yield and sugar content of sugar beet in Ireland.** *Dublin Institute of Advanced Studies, Geophysical Memoirs*, No. 3, Pt. 1, **1951.** 53 p. 10 figs., 34 tables, 21 refs., equations. **DWB**—An excellent statistical study of crop yield and quality, based on crop and weather data for 1927–1948, with predictions for 1940–1948. Monthly mean temperature; temperature and sunshine; and temperature, sunshine and rainfall (total) were used as independent variables and sugar beet yield or sugar content for County Waterford, Eire, as dependent variables, and a regression equation set up for predicting these quantities. Best correlation was for June sunshine or temperature. Average error in forecast yields 8.5%, in sugar content 3%. *Subject Headings:* **Agricultural meteorology, Crop yield forecasting, Statistical studies, Eire.**—*M.R.*

2.9–7 551.5:656.6:06

Commission for Maritime Meteorology, abridged final report, 17th session at Toronto, Canada from 11th August to 6th September 1947. *Organisation Météorologique Internationale, Publication* No. 65, **1949.** 118 p. In English and French. **DWB**—The immense work of the Commission for Maritime Meteorology at its 17th session accounts for its passing 86 resolutions which dealt with the improvement of ocean networks; stationary weather ships; general questions concerning codes for reports from ships and their relationship with those issued in collective messages for shipping; reports from ships and shore stations on ocean waves; reports from ships as to ice conditions; weather information for shipping; training of voluntary observers; improvement in instruments and methods of observation; equipment for ship stations; publications for marine purposes; aerological observations from merchant ships; International Convention for Safety at Sea; marine climatological observations and the recovery of Netherlands log-books removed by the Germans during the war. Resolutions are given in both English and French. The report also contains a list of members of the Commission and photograph and list of those present at the session. *Subject Headings:* **I.M.O. Publications, I.M.O. Maritime Meteorology Commission, Toronto Conference of 1947.**—*G.C.B.*

2.9–8 551.5:92

Millikan, Robert A., **The autobiography of Robert A. Millikan.** New York, Prentice-Hall, Inc., [1950]. 311 p. 5 append. **DLC**—A very readable account of the life of one of the outstanding physicists and administrators of the 20th century. DR. MILLIKAN begins with reminiscences of his boyhood in small Iowa towns, his undergraduate career at Oberlin, and his famous scientific work at Chicago University. His textbooks in physics have aroused many young men to an active interest in meteorology, and during the First World War DR. MILLIKAN organized the meteorological service (under the U. S. Signal Corps) which was part of the A.E.F. in France. Those who had aerological training were among the first in the U.S.A. to grasp the 3-dimension concept of meteorology. California Institute of Technology, which was under MILLIKAN's guidance from 1921–1949, was a pioneer in giving advanced courses in meteorology. *Subject Headings:* **Physics, Robert Millikan, Biography.**—*M.R.*

2.9–9 551.5(04)

§Fisher, Robert Moore, **How about the weather?** New York, Harper, **1951.** 186 p. 5 figs., 16 plates, 16 charts, refs., apprends. **DWB**—A new popular book on weather (clouds, pressure, circulation, air masses, fronts, fog, winds, temperature, rainfall, etc.) with special emphasis on amateur forecasting and on interpreting weather maps. *Subject Headings:* **Popular meteorology, Amateur forecasting.**—*M.R.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

OBSERVATIONS

2.9–10 551.501:06 551.508:06

Commission for Instruments and Methods of Observations, abridged final report, 1st session at Toronto, Canada, from 4th to 16th August 1947. *Organisation Météorologique Internationale, Publication* No. 68, 1949. 83 p. In English and French. **DWB**—This report contains the text, in both English and French, of the 40 resolutions passed by the Title Commission. These resolutions dealt with all the principal classes of meteorological instruments. They suggested standards of exposure, accuracy of instruments, barometer corrections, visibility and ceiling measurements. The Commission recommended a "Guide for International Meteorological Practices for Instruments and Methods of Observation" to be compiled as soon as possible. A list of the members of the Commission and a photograph of those present at Toronto are given. *Subject Headings:* **I.M.O. Publications, Toronto Conference of 1947, Meteorological instruments, Methods of observation.**—*G.C.B.*

2.9–11 551.501.1:551.55(26)

Millar, F. Graham and Macphail, H. W., **Observing the apparent wind on shipboard.** *Marine Observer*, 21(152):126–130, April 1951. 2 figs. **DWB**—When true wind force cannot be estimated from state of sea, a scale of 0–8 apparent wind is given from effects on person, rigging, flags, and smoke plumes. A graphical method of correcting to true wind is illustrated. *Subject Headings:* **Instruction for observers, Wind estimation.**—*C.E.P.B.*

2.9–12 551.501.4

Ogiwara, M., **On stochastic interpolation of omitted observations.** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):50–57, Oct. 1950. 6 refs., 5 equations. In English. **MH-BH**—When a meteorological observation is lost, e.g., by instrumental failure, it may be estimated from preceding and subsequent values, from neighboring stations or from both. Author derives expressions for computing missing observations and their probable errors, assuming that the series are autoregressive and a group of stations forms a matrix. *Subject Headings:* **Methods of computation, Instrument failure.**—*C.E.P.B.*

2.9–13 551.501.4:517.2

Wilkes, M. V., **A process for the step-by-step integration of differential equations in an automatic digital computing machine.** *Cambridge Philosophical Society, Proceedings*, Vol. 47, Pt. 1:96–108, Jan. 1951. 4 tables, 32 equations. **MH-BH**—It is advantageous in automatic computers to employ methods of integration which do not require preceding function values to be known. From a general theory given by KUTTA, one such process is chosen giving fourth order accuracy and requiring the minimum number of storage registers. It is developed into a form which gives highest attainable accuracy and can be carried out with minimum instructions. Errors are discussed and examples given. *Subject Heading:* **Computing machines.**—*From author's abstract.*

2.9–14 551.501.7:551.508.822

Radiosonde stations. U. S. Weather Bureau, April 1, 1951. **DWB**—A chart of the Northern Hemisphere showing the land and ocean radiosonde stations in North America and the Atlantic and Pacific Oceans operated by United States Weather Bureau, the Radiosonde Meteorological Services of Canada and other cooperating services. *Subject Headings:* **Radiosonde networks, U. S. Weather Bureau.**—*W.S.*

2.9–15 551.501.9(26)

U. S. Coast Guard, **Weathermen of the sea, ocean station vessels.** Washington, D. C., U. S. Coast Guard, Public Information Div., [1950]. 15 p. photos, map. **DLC**—A beautifully illustrated pamphlet describing life on a Coast Guard weather ship in the Atlantic. Advantages for training weather observers and strenuous duties while at sea are emphasized. Work in oceanography, communications, air-sea rescue work, as well as in radiosonde and

surface weather observations, is described and illustrated. Map shows location of the international network in the Atlantic. A brief history of this and similar enterprises is included. *Subject Headings:* **Ocean weather stations, Marine meteorology, North Atlantic Ocean.**—*M.R.*

2.9–16 551.506.8:581.036.5:633.1

Hänsel, Hermann, **Vernalisation bei negativen Temperaturen.** [Vernalization at minus temperatures.] *Wetter und Leben*, 3(3–4):44–47, March **1951.** 2 figs. **DWB**—Vernalization is internal modification of the embryo by cold treatment in suitable feeding medium. Usual temperature 1–3°C. but possible down to nearly −6°C. Author illustrates effect at −6 to +3°C. on sprouted embryos of winter rye. *Subject Headings:* **Vernalization, Phenology, Agriculture.**—*C.E.P.B.*

2.9–17 551.506.1(43)

*Germany. Deutsche Demokratische Republik, Meteorologischer Dienst, **Deutsches Meteorologisches Jahrbuch 1948. Teil I, Tägliche Beobachtungen.** [Daily observations]. Berlin, **1951.** 152 p. **DWB**—Observations for 4 times a day for 12 stations, for each day in 1948. Cloudiness with and without cirrus and other usual elements recorded in accordance with I.M.O. practice. Sunshine duration for 22 stations. *Subject Headings:* **Observational data, Germany.**—*M.R.*

2.9–18 551.506.1(68)

*South Africa. Weather Bureau, **Report for the year 1946.** Pretoria, Die Staatsdrukker, **1950.** 173 p. chiefly tables. Contents and text in Afrikaans and English. Price 6 s. **DWB**—Contains isohyetal chart; index to 1st, 2nd and 3rd order stations, climatological tables for 1st and 2nd order stations and for 3rd order stations; grass minimum temperatures, earth temperatures at 1, 2, 4, 6 and 10′ for 16 stations, mean hourly values of temperature and relative humidity; rainfall data for numerous stations, and list of rainfall stations. *Subject Headings:* **Weather reports, Observational data, South Africa.**—*M.R.*

2.9–19 551.506.5(98,99)

Expéditions Polaires Françaises, **Projet préliminaire des expéditions polaires françaises dans l'Arctique et dans l'Antarctique, 1947–1950.** [Preliminary project of the French Polar Expedition to the Arctic and Antarctic, 1947–1950.] Procés-Verbal de la Réunion du 29 mars 1947; 24 octobre 1947; 22 avril 1948. [Paris, **1947?**] Mimeographed. **DWB. Rapport sur l'étude et la mise au point de l'expédition antarctique française (Terre Adélie).** [Report on the studies and the program of the French Antarctic Expedition (Adélie Land).] Paris, [**1948?**] 23 p. Mimeographed. **DWB. La France dans les terres polaires. II—L'expédition antarctique française 1948–1951 et Terre Adélie.** [France in the polar land. II.—French Antarctic Expedition and Adélie Land, 1948–1951.] Paris, [**1947?**] 7 leaves. map. Mimeographed. **DWB. L'expédition antarctique française à la Terre Adélie.** [French Antarctic Expedition to Adélie Land.] Paris, [**1948?**] 9 p. Mimeographed. **DWB**—Contains a brief description of the type of meteorological investigations to be undertaken by the Arctic and Antarctic polar meteorologists and the names of the participating meteorologists. *Subject Headings:* **Arctic expeditions, Antarctic expeditions.**

2.9–20 551.506.5(988)

*Expéditions Polaires Françaises, **L'expédition arctique française; campagne préparatoire au Groënland, 1948.** [The French Arctic Expedition; preparations for the expedition to Greenland, 1948.] [Paris, **1948?**] 12 p. Mimeographed. **DWB. Résumé des opérations effectuées à la date du 27 juillet 1948.** [Resume of the operations carried out up to July 27, 1948.] [Paris, **1948?**] 3 leaves. Mimeographed. **DWB. Recueil des observations météorologiques effectuées par la station française du Groënland entre le 20 juillet 1949 et le 14 juillet 1950.** [Correlation of meteorological observations carried out at the French station at Greenland from July 20, 1949 to July 14, 1950.] France, Météorologie Nationale, **1950.** 162 p. Mimeographed. **DWB**—A general description of the preparations for the expeditions, containing a list of personnel of bases, various technical details such as transporta-

tion, food, etc. The monograph contains daily surface synoptic observations and weekly summaries, wind observations by means of pilot balloons and radiosonde data. The data have not been analyzed; they are given in their original form. *Subject Headings:* **Arctic expeditions, Meteorological data, Greenland.**—*I.L.D.*

2.9–21 551.507.1:551.501.8

Mobile ionospheric station. *U. S. National Bureau of Standards, Technical News Bulletin*, 35(4):45–47, April 1951. 3 figs. **DWB**—Besides a network of 60 ionospheric stations that furnish data to the Bureau of Standards for forecasts of ionospheric or radio propagation conditions, a mobile ionospheric research unit (with 2 tractors) can be moved to any critical point in the propagation path to transmit impulses to the ionosphere, for reception at stations on either or both sides. Results should give more knowledge of "fading." *Subject Headings:* **Mobile weather stations, Ionospheric research.**—*M.R.*

2.9–22 551.507.362:551.510.53

Bohn, J. Lloyd and Nadig, Francis H., **Research in the physical properties of the upper atmosphere with V-2 rockets.** *Temple University, Research Institute, Technical Report* No. 9, Sept. 15, 1950. 7 leaves. 3 figs., 2 graphs. **DWB**—Brief illustrated report showing amplifier equipment constructed during the past quarter and records made with equipment. Attempts were made to find out if there was any change in velocity of a sound wave travelling parallel to a flat plate. None was found. *Subject Headings:* **Rocket research, Stratosphere, Acoustical propagation.**—*M.R.*

INSTRUMENTS

2.9–23 551.508.29

Anderson, L. J. and Heibeck, H. L., **A tau-meter for rapid-response temperature recording systems.** *American Meteorological Society, Bulletin*, 32(2):67–71, Feb. 1951. 4 figs., table, 9 equations. **MH-BH**—Equipment is described and illustrated for measuring temperature fluctuations with a lag coefficient of as little as .1 second. It was found that the lag of the recorder system was small compared with that of the thermocouples or thermistors. The same equipment could be used to measure lag in humidity or wind sensing elements. *Subject Headings:* **Calibration equipment, Thermistors.**—*M.R.*

2.9–24 551.508.53

Hartley, G. E. W., **How to make a remote-indicating wind-vane.** *Weather*, 6(1):11–14, Jan. 1951. 2 figs. **DWB**—A simple wind vane is fitted with electrical transmission gear to an indicator board with 8 small lamps. Components are easily obtained; full constructional details given. *Subject Heading:* **Wind indicators.**

2.9–25 551.508.53/4

Heywood, G. S. P., **Corrosion in a Dines anemograph head.** *Meteorological Magazine*, London, 80(943):22–23, Jan. 1951. **DWB**—At Hongkong the anemograph shield was stuffed with cotton wool. This became damp and corroded pressure and suction tubes by electrolytic action. *Subject Heading:* **Anemographs.**

2.9–26 551.508.53/4

Sanuki, M., **Studies on biplane wind vanes, ventilator tubes and cup anemometers (Pt. I).** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):81–132, Oct. 1950. 30 figs., 17 tables, 9 refs., 108 equations. In English. **MH-BH**—This is the first of a series of papers dealing with the theory and practice of anemometers—biplane wind vanes, pressure tubes of various shaped cross sections, robots and cup anemometers. This part discusses the mathematical calculation of their characteristics. Comparison with wind tunnel observations will be given in later parts. *Subject Headings:* **Wind vanes, Anemometers.**—*C.E.P.B.*

2.9–27 551.508.54

Crawford, S. G., **A simple form of sensitive electric contact cup anemometer.** *Journal of Scientific Instruments*, 28(2):36–37, Feb. 1951. 3 figs., 2 refs. **DWB**—A make-and-break

contact is substituted for the counting mechanism in the recording cup anemometer so that accurate wind speeds can be obtained from 3 to 20 m./sec. with a 6 V battery and low resistance register. The rotor, contact unit and counter are described and illustrated in detail. The calibration curve remained linear after several months of operation over open country and over the sea. *Subject Heading:* **Anemometers.**—*M.R.*

2.9–28 551.508.54 551.508.77

Hamilton, E. L. and Andrews, L. A., **San Dimas rainfall and wind velocity recorder.** *American Meteorological Society, Bulletin*, 32(1):32–33, Jan. **1951.** 3 figs. **MH-BH**—A description and illustration of records and equipment in use for 6 months at the San Dimas (California) Forest and Range Experiment Station. A vertical-drum water-stage recorder has been adapted to make it possible to record simultaneously (by one pen tracing) both rainfall amount and wind speed. The 3-cup anemometer makes a standard type of U-shaped trace for each mile of wind which passes, whereas every hundredth of an inch of rain is marked on the trace by a quick up and down barb. Only occasionally will there be confusion due to simultaneous occurrence of the 2 contacts. *Subject Headings:* **Wind recorders, Rainfall recorders.**—*M.R.*

2.9–29 551.508.59

Cicala, Aldo, **Un criterio comparativo per la stima della forze del vento mediante la manica a vento.** [A comparative criterion for estimating the force of the wind by means of a wind sock.] *Rivista di Meteorologia Aeronautica*, 10(3):35–36, July–Sept. **1950.** 2 figs. **MH-BH**—A chart shows the relative positions of a wind sock for 10 different degrees of wind speed (0–1 to >40 km./h.) and a nomogram reduces these positions to graphical form. Brief description of method, which is used at airports, mentions error which might occur during heavy rain. *Subject Headings:* **Wind indicators, Wind force observations, Airways observations.**—*M.R.*

2.9–30 551.508.762

Baude, André, **La télémetrie des nuages au moyen d'impulsions lumineuses.** [The measurement of cloud heights by means of light rays (impulses)]. *Radio Française*, No. 10:3–17, Oct. **1949.** 24 figs., 3 refs. Photostat. **DWB**—The use of infrared light impulses for determining ceiling heights is discussed in general and the equipment described in detail. Calibration of ceilometers and receivers, observational difficulties and comparison of results with ceiling balloon, radiosonde, radar and other methods, treated. Actual records are reproduced and described, and details of equipment shown photographically. Supplementary information on clouds and atmosphere is also obtainable. *Subject Headings:* **Ceiling projectors, Cloud height measurement, France.**—*M.R.*

2.9–31 551.508.824:551.508.5

Kamamoto, H. and Kimura, S., **Wind-direction and speed robot.** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):77–80, Oct. **1950.** 4 figs. In English. **MH-BH**—Describes and illustrates wireless audio-frequency transmitting and receiving sets for obtaining hourly wind observations at remote places. Wiring diagrams given. It is somewhat susceptible to temperature changes, but is suitable for southern islands. *Subject Headings:* **Automatic weather stations, Wind recorders.**—*C.E.P.B.*

2.9–32 551.508.85

Aslakson, Carl I. and Fickeissen, Omar O., **The effect of meteorological conditions on the measurement of long distances by electronics.** *American Geophysical Union, Transactions*, 31(6):816–826, Dec. **1950.** 6 figs., 3 tables, 6 refs., 10 equations. **DWB**—Practical methods for correcting long distance electronic measurements, limited to frequencies peculiar to shoran or from about 220 to 250 megacycles per second, for variations in meteorological conditions are described. The following topics are considered: the technique of making meteorological observations by airplane, the empirical relationship expressing the index of refraction in terms of total pressure and water vapor pressure in millibars and absolute temperature (relationship used for U. S. Air Force projects); the manner in which curvature of the shoran ray affects geodetic distance; the methods of correcting for ray path curvature used by the U. S. Air Force,

by Canada and by KROLL (U. S. Army Map Service); the effect of meteorological variations upon the velocity correction; the analysis of errors due to the uncertainty of the velocity of radio waves in a vacuum and to the uncertainty of the index of refraction of moist air. *Subject Headings:* **Long distance measurement, Radio transmission ducts, Electronic measurement.**—*I.L.D.*

2.9–33 551.508.92:551.591

Cena, Giuseppe, **La visibilitá meteorologica; misura a vista e strumentali.** [Visibility: visual and instrumental measurements.] *Rivista di Meteorologia Aeronautica*, 10(3):14–17, July–Sept. **1950.** Italian, French, English and German summaries p. 14. **MH-BH**—A review of the problems discussed at the recent seminar at the Meteorological Office (*see item* No. 6–18 in June 1950 *Meteorological Abstracts*) which was presented in the *Meteorological Magazine*, April 1950. Various types of instruments are mentioned, as well as the theory of KOSCHMIEDER and GÖTZ. *Subject Headings:* **Visibility measurement, Visibility instruments.**—*M.R.*

2.9–34 551.508.94

Burkard, Otto and Zych, D., **Luftelektrische Messungen mit stabilisiertem Netzgerät.** [Atmospheric measurements with a stabilized connection apparatus.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(1–2):102–108, **1950.** 3 figs., 6 equations. German, English and French summaries p. 102. **MH-BH**—Author gives a wiring diagram of an apparatus for obtaining constant currents and voltages from an A.C. power supply. An appendix gives a preliminary account of the determination of the ionization strength with an automatic wire-mesh ionization chamber. *Subject Heading:* **Electrometers.**—*C.E.P.B.*

2.9–35 551.508.95:546.264

Effenberger, Ernst, **Messmethoden zur Bestimmung des CO_2-Gehaltes der Atmosphäre und die Bedeutung derartiger Messungen für die Biometeorologie und Meteorologie. (1. Teil: Messmethoden.)** [Methods of measurement of the CO_2 content of the atmosphere and the importance of such measurements for biometeorology and meteorology. (Pt. 1. Methods of measurement.)] *Annalen der Meteorologie*, 3(11–12):321–328, **1950.** 4 figs., table, 15 refs. German and English summaries p. 321. **MH-BH**—After pointing out importance of CO_2 in meteorology, author describes methods of analysis: gravimetric (weight of absorbed CO_2, unsuitable); analytical (e.g. $Ba(OH)_2+CO_2=BaCO_3+H_2O$, used by him as a standard). He then describes various rapid methods; his own (change of p_H in barytes water), WINKLER (conversion of Na_2CO_3 into $NaCO_3$, results too low) and WILSON (solution of $NaCO_3$). Self-recording methods are costly; they include electrical conductivity, reaction heat, p_H measurement and infra-red absorption. *Subject Headings:* **Carbon dioxide measurement, Atmospheric composition.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

2.9–36 551.509.1

Morasca, Nicola, **Radiotrasmissione di carte meteorologiche.** [Radiotransmission of meteorological charts.] *Rivista di Meteorologia Aeronautica*, 10(3):29–31, July–Sept. **1950.** 2 figs. Italian, French, English and German summaries p. 29. **MH-BH**—A system of radio transmission of isobaric or contour charts, which does not involve scanning of the whole sheet with a photoelectric cell, or sensitized paper, is described briefly. The principle of the "electrocoordinatograph" is used, which permits variation of the scale on the receiving end. *Subject Heading:* **Facsimile map transmission.**—*M.R.*

2.9–37 551.509.21(26)

B————, J. E., **Use made of Atlantic Weather Bulletin.** *Marine Observer*, 21(152):122–125, April **1951.** 3 charts. **DWB**—Three analyzed charts prepared on a ship from bulletin broadcast from Portishead. Successful forecasts were made from them. *Subject Headings:* **Synoptic charts, Marine meteorological data.**—*C.E.P.B.*

2.9–38 551.509.3:06

Kolobkov, N. V., **Pogoda i ee predvidenie.** [The weather and its forecasting.] Moscow, Gosizdat., **1950.** 55 p. 28 figs. **DLC**—This is a popular, simply written description of the science of meteorology, including both dynamic and synoptic meteorology. The properties of the weather elements are described and illustrated by means of physical examples; also air masses, fronts, cyclones and anticyclones are described. An account of the development of meteorology in Russia and of the Soviet Meteorological Service, a description of scientific methods of forecasting and Soviet work on long range weather forecasting (the work of MULTANOVSKIĬ, KIBEL′, etc.) are discussed. A chapter on various local signs (based on observations of winds and clouds and readings of temperature and pressure), useful for weather forecasting, is included. The historical treatment of meteorology is very nationalistic, only the achievements of Soviet meteorologists are mentioned. *Subject Headings:* **Weather forecasting, Meteorological services, U.S.S.R.**—*I.L.D.*

2.9–39 551.509.3 551.509.54

Miller, Sandford R. and Dickey, Woodrow W., **An objective method of forecasting winter-time precipitation in northeast Colorado.** *Monthly Weather Review*, 78(9):161–169, Sept. **1950.** 11 figs., 7 tables, 7 refs. **DWB**—A method for forecasting precipitation during the summer from 12 to 36 hours in advance for northeastern Colorado is presented. The selection of variables, which precede the formation of upslope at the surface or indicate the continuation of upslope flow, is discussed. The variables are combined by a method of graphical correlation. The application of the precipitation forecasting method is illustrated when applied to independent data, a skill score above chance of fifty percent is obtained. *Subject Headings:* **Objective forecasting, Precipitation forecasting, Colorado.**—*I.L.D.*

2.9–40 551.509.31:06

Commission for Synoptic Weather Information, abridged final report, 13th session at Toronto, Canada from 25th August to 14th September 1947. *Organisation Météorologique Internationale, Publication* No. 66, **1949.** 104 p. In English and French. **DWB**—Contains 49 resolutions of the Commission and five joint resolutions with the Commission for Maritime Meteorology and the Commission for Aeronautical Meteorology. Extensive revisions of the synoptic codes were recommended. Forms for messages containing surface and upper air winds, reports from aircraft and for terminal and flight forecasts were specified. Other resolutions sought to standardize synoptic maps and hours of observation, take advantage of radar and sferic techniques, have frequent inspection of stations and improve frequencies and time of international synoptic broadcasts. A list of the members of the Commission and a photograph of those present at Toronto is given. *Subject Headings:* **I.M.O. Publications, Synoptic Weather Information Commission, Toronto Conference of 1947.**—*G.C.B.*

2.9–41 551.509.31

§Fawbush, E. J., Miller, R. C. and Starrett, L. G., **An empirical method of forecasting tornado development.** *American Meteorological Society, Bulletin*, 32(1):1–9, Jan. **1951.** 6 figs., table, 12 refs. **MH-BH**—Charts show frequency of tornadoes in eastern United States by months and for year (1920–1949). Relation to elevation and air mass or frontal characteristics formulated. Situation on May 5, 1950 analyzed in detail. Success of forecasting method outlined herein, shown by verification figures for 1948–1950 seasons. *Subject Headings:* **Tornado forecasting, Tornado distribution, Mississippi Basin.**—*M.R.*

2.9–42 551.509.33:551.465

Sheridan, L. W., **The use of ocean currents in long range forecasting.** U. S. Weather Bureau, [n.d.]. 11+leaves. 6 figs., 4 charts, 26 refs. Typescript. **DWB**—After reviewing former investigations and literature on the subject, the author sets up a procedure, based on work of P. H. GALLE in Holland, using a multiple regression technique (FISHER), where the strength of the easterlies in the trade wind zone of the Atlantic is used as the independent and the subsequent winter temperatures at Valentia, Berlin and Bodo as the dependent variable. No significant relation was found when data for 1900–1914 was used and 1915–1930 data as

test series. Winds at 6 points along the Gulf Stream were then used as independent variable and results proved no more significant. *Subject Headings:* **Long range forecasting, Easterly index, Gulf Stream, Western Europe.**—*M.R.*

2.9–43 551.509.34 551.509.319

Kibel' I. A., **Ob oshibke Gaurvitsa.** [On the error of Haurwitz.] *Meteorologiia i Gidrologiia*, No. 3:30–33, **1947.** 5 refs., 8 equations. Translation available. **DWB**—The author analyzes an article by Prof. B. HAURWITZ in *American Meteorological Society, Bulletin*, 1946, containing a criticism of I. KIBEL's method of forecasting and points out the erroneous interpretation by HAURWITZ of the method criticized, as well as some other faults of American meteorologists. *Subject Headings:* **Single station forecasting, Kibel's method of forecasting.**—*C.K.*

2.9–44 551.509.34:551.524.37 551.501.6

Lessmann, H., **Ein Beitrag zum Problem der Vorhersage von Nachtfrösten und Strahlungsnebeln.** [A contribution to the problem of forecasting night frosts and radiation fogs.] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen*, **1950.** p. 46–52. 4 figs., 6 tables, 4 refs. **DWB**—The author discusses critically the use of tephigram by FAUST for predicting night frost and radiation fogs. The method is regarded unreliable and cumbersome. The author then proposes a modification of the KAMMERMANN rule by taking into consideration the degree of continentality of the climate of a particular locality. *Subject Headings:* **Frost forecasting, Radiation fog forecasting, Tephigrams.**—*I.L.D.*

2.9–45 551.509.34

Masse, L., **La prévision locale du temps.** [Local weather forecast. Pt. II.] *La Météorologie*, 4th Ser., No. 20:227–239, Oct.–Dec. **1950.** 2 figs. French, English and Spanish summaries p. 227. **MH-BH**—The uses to which information on changes in cloud formations, temperature, humidity, pressure, visibility, surface wind direction and speed, etc. can be put in local forecasts are enumerated, and "rules of thumb," some of them quite ancient, are discussed and modified. An example of the evolution and decay of a bad weather situation is treated at some length. The accuracy of this method is then discussed in general terms. *Subject Headings:* **Local forecasting, France.**—*M.R.*

2.9–46 551.509.34:551.524

Schwerdtfeger, Werner, **Bases para el pronóstico a medio plazo de las condiciones de temperatura en el otoño de Buenos Aires.** [Bases for medium range forecasting of temperature conditions in autumn at Buenos Aires.] *Meteoros*, Buenos Aires, 1(1):33–45, Jan. **1951.** 5 tables, refs. Spanish and English summaries p. 33. Reprint available. **DWB**—The author indicates a need for statistical forecasting methods to compensate for the limitations of synoptic forecasting due to inadequate observational coverage of the South Pacific. A multiple correlation method for forecasting mean daily temperature is presented which uses three independent variables: 1) deviation of temperature from normal, 2) pressure difference between Buenos Aires (35°S) and Santa Cruz (50°S), and 3) interdiurnal pressure variation at Buenos Aires. The method was shown to be useful in forecasts made during 1949 by personnel of the Argentine Meteorological Service. The author points out that his technique can still be improved by introducing other parameters. *Subject Headings:* **Extended forecasting, Temperature forecasting, Argentina.**—*R.S.Q.*

2.9–47 551.509.5

Sartor, J. Doyne and Leight, Walter G., **A study of changes made to extended forecast section forecasts by District Forecast Centers.** U. S. Weather Bureau, Extended Forecast Section, July **1948.** 8 leaves. fig., 4 tables. **DWB**—Verification procedures are explained and results shown tabularly. Evidence is that about one third of the 5-day forecasts issued at Washington, D. C., are changed by the District Forecast Center, with most of the changes for the better (20% improved, 13% made worse). For all cases the original forecasts were correct 39% and the revised forecasts 42% of the time. *Subject Headings:* **Forecast verification, Extended forecasting.**—*M.R.*

2.9–48 551.509.52

§Shisler, Karl, **An initial solution to the hurricane problem of the offshore oil operator in the Gulf of Mexico.** *American Meteorological Society, Bulletin,* 32(3):79–88, March 1951. 8 figs., table, 5 refs. **MH-BH**—The necessity for adequate warning of the exact time and strength of hurricane onset to allow for shutting down offshore oil drilling in the Gulf of Mexico is propounded. A novel series of charts is presented for use in calculating average evacuation period for hurricanes originating in the Atlantic, Caribbean or Gulf, respectively. Techniques followed during a typical storm are outlined wherein knowledge of synoptic meteorology, climatology and oceanography are combined to give optimum advice. *Subject Headings:* **Industrial forecasting, Hurricane warnings, Gulf of Mexico.**—*M.R.*

CLOUD SEEDING AND ARTIFICIAL PRECIPITATION

2.9–49 551.509.67

Cloud seeding pays off out West, *Aviation Week,* 52(16):39, April 17, 1950. **DLC**—Cloud seeding flights over the Sierras in California are claimed to have produced enough snow to add 2 billion gallons of water to the reservoirs of the California Electric Power Co. Dry ice was used as silver iodide must be released beneath the clouds and low level flying is dangerous in the Bishop Valley area. Cost was about $200 per hour of flight. *Subject Headings:* **Cloud seeding, California.**—*M.R.*

2.9–50 551.509.67

Control of rainmaking. *Science News Letter,* 59(12):182, March 24, 1951. **DLC. Weather control remote.** *Ibid.,* 59(13):198, March 31, 1951. **DLC**—A brief summary of the testimony presented before Senate subcommittees, considering bills which would place research and control in rainmaking in the Federal Government. The U. S. Weather Bureau argued against strict control by the Government. The Interior Department and private scientists advocated such control. *Subject Headings:* **Artificial precipitation, Weather control hearings.**—*I.L.D.*

2.9–51 551.509.67:92

Hall, Ferguson, Emmons, Gardner, Haurwitz, Bernhard and others, **Dr. Langmuir's article on precipitation control.** *Science,* 113(2929):189–192, Feb. 16, 1951. **MH-BH**—Criticism is levelled at Dr. Langmuir's conclusion that the silver iodide seed in tests carried out by him in New Mexico in 1948 and 1949 produced all of the rain in that state on the days of the seeding. In the opinion of the critics Dr. Langmuir erroneously assumed that the distribution of rainfall is purely random and that adjacent areas are independent of one another, that he failed to consider the normal rainfall pattern before concluding that the correlation between the rainfall patterns on the days of seeding was higher than normal and that he has not demonstrated satisfactorily that the occurrence of rainfall coincided with the distribution of silver iodide in areas beyond the center of silver iodide generation. Moreover, it is contended that, from purely physical reasoning, it is impossible to deduce conclusively the meteorological processes resulting from silver iodide introduction in the atmosphere and that the time of effectiveness of silver iodide has not been determined. *Subject Headings:* **Cloud seeding, Artificial precipitation, Irving Langmuir.**—*I.L.D.*

2.9–52 551.509.67:551.574.1

Houghton, Henry G., **An appraisal of cloud seeding as a means of increasing precipitation.** *American Meteorological Society, Bulletin,* 32(2):39–46, Feb. 1951. 8 refs. **MH-BH**—A review of recent attempts to produce precipitation by artificial seeding of clouds, and the scientific basis for results or lack of results in various individual cases. The thermodynamic effects, the use of artificial versus natural nuclei, the seeding of clouds already precipitating and possible large-scale effects are considered. It is concluded that under certain conditions precipitation may be induced at an earlier stage than would occur naturally, but that no large-scale effects are likely. *Subject Headings:* **Artificial precipitation, Cloud seeding.**—*M.R.*

2.9–53 551.509.67

North American Weather Consultants, **Facts about increasing precipitation through cloud seeding.** Pasadena, Jan. **1951.** 6 leaves. 4 figs. **DLC**—A brief discussion of the salient points in cloud seeding techniques, written for popular consumption. Paragraphs on cloud physics, dry ice seeding, silver iodide seeding, natural nuclei, effects of over-seeding, results achieved by seeding thus far, amount of moisture robbed from areas downwind, formation of clouds by seeding, and difficulty in evaluating results without long and careful statistical checks, are included along with schematic diagrams. *Subject Headings:* **Artificial precipitation, Cloud seeding, Silver iodide.**—*M.R.*

2.9–54 551.509.67

Pearce, R. P. and Eldridge, R. H., **Weather control.** *Weather*, 6(5):157, May **1951. DWB**—Letter on the unpredictable risks that interference with weather in one place may have wide repercussions. *Subject Heading:* **Artificial precipitation.**—*C.E.P.B.*

2.9–55 551.509.67

Rain making. *Current Science*, Bangalore, 20(1):12, Jan. **1951. MH-BH**—An abstract of a lecture delivered by S. K. Banerji. The silver iodide method is described briefly *Subject Headings:* **Artificial precipitation, Silver iodide.**

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

2.9–56 551.510.4:551.12

†Poole, J. H. J., **The evolution of the earth's atmosphere.** *Royal Dublin Society, Scientific Proceedings*, 25(16):201–224, May 1, **1951.** 2 figs., 6 tables, 41 refs. **DWB**—This is a comprehensive and excellent discussion of various hypotheses and of the evidence on the evolution of the earth's atmosphere. It contains a discussion of the earth's primitive atmosphere before the formation of the oceans and it is concluded that it contained no free oxygen. The various mechanisms proposed to explain the production of oxygen such as the photosynthetic reduction of CO_2, the thermal dissociation of atmospheric water vapor (Tammon theory) and the photochemical dissociation of atmospheric water vapor (theory of Hartek and Jensen) are presented and analyzed critically. The author presents geological evidence indicating the absence of free oxygen in the earth's atmosphere during a considerable part of the earth's existence. *Subject Headings:* **Atmospheric composition, Atmospheric evolution.**—*I.L.D.*

2.9–57 551.510.41:551.510.53

Chackett, K. F., Paneth, F. A. and Wilson, E. J., **Chemical analysis of stratosphere samples from 50 and 70 km height.** *Journal of Atmospheric and Terrestrial Physics*, 1(1):49–55, **1950.** 2 figs., table, 10 refs. **MH-BH**—Samples of air from 50–70 km. obtained by rocket were analyzed (method described). Ratios of He, Ne and A to (N_2+A) show no significant differences from ground values. The absence of oxygen was due to oxidation of copper tube during collection. *Subject Headings:* **Atmospheric composition, Stratosphere.**—*C.E.P.B.*

2.9–58 551.510.42

Leighton, P., **Smoke haze, Australian waters.** *Marine Observer*, 21(151):11, Jan. **1951. DWB**—Sky completely blacked out off Albany on March 15, 1950 by smoke from forest fire. *Subject Headings:* **Atmospheric pollution, Smoke haze, Australia.**—*C.E.P.B.*

2.9–59 551.510.42

Proshin, P. I., **O merakh bor'by s zagriazneniem atmosfernogo vozdukha Moskvy.** [Measures for controlling air pollution in Moscow.] *Gigiena i Sanitariia*, No. 1:13–16, Jan. **1951. DLC**—Extensive measures for controlling air pollution in Moscow were begun in 1945. The major sources of air pollution are the central power stations. The various measures that have been undertaken and planned to diminish air pollution are described. These include smoke and dust precipitations, electrical filtration, etc. *Subject Headings:* **Atmospheric pollution, Moscow, U.S.S.R.**—*I.L.D.*

2.9–60 551.510.42

Smith, Clarence D., Jr., **The widespread smoke layer from Canadian forest fires during late September 1950.** *Monthly Weather Review*, 78(9):180–184, Sept. **1950.** 6 figs., 5 refs. **DWB**—The author describes the source and spread of the smoke, the synoptic situation in the fire area, the upper air conditions on Sept. 22–27, 1950 in Canada and in the United States and the effects of the smoke layer. Synoptic maps, the trajectories of air parcels, calculated on isentropic charts of $\theta = 312°A$, are presented. *Subject Heading:* **Smoke pall—Sept. 1950, Smoke aloft.**—*I.L.D.*

2.9–61 551.510.42

Wexler, Harry, **On the effects of volcanic dust on insolation and weather (I).** *American Meteorological Society, Bulletin*, 32(1):10–15, Jan. **1951.** 26 refs. **MH-BH**—Radiation measurements made after volcanic outbreaks indicate that a decrease in many wave lengths of as much as 10% can occur although long wave radiation is not as drastically affected. Theories of climatic change are examined and the theory of effect of volcanic dust given special attention. Eruption of Krakatoa (1883) and to some extent other eruptions cited as evidence. Effect of some kinds of dust in nucleation as well as in increase of general circulation offered as possible cause of glaciation. *Subject Headings:* **Volcanic dust, Insolation, Climatic variations.**—*M.R.*

2.9–62 551.510.53:001

Chapman, Sydney, **Upper atmospheric nomenclature.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):201, **1951.** 2 refs. Addendum to *ibid.*, 1(2):122. **MH-BH**—Author proposes "turbosphere" for the whole region of mixing up to at least 60 km. (*See items* No. 2.3–49 in March, 2.6–46 in June and 2.7–53 in July 1951 *Meteorological Abstracts.*) *Subject Headings:* **Atmospheric structure, Definitions.**

2.9–63 551.510.53:001

Gerson, N. C. and Kaplan, J., **Nomenclature of the upper atmosphere.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):200, **1951.** **MH-BH**—Proposes "chemosphere" for region of minimum temperature 60–100 km. and layer of rising temperature above it (CHAPMAN's mesosphere and thermosphere), and "mesosphere" from 400 km. to exosphere. They accept the term "airglow." (*See also items* No. 2.3–49 in March, No. 2.6–46 in June and No. 2.7–53 in July 1951 *Meteorological Abstracts.*) *Subject Headings:* **Atmospheric structure, Definitions.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

2.9–64 551.510.535

Baral, S. S., **Ionospheric studies at Calcutta (1944–50).** *Journal of Scientific and Industrial Research*, 10(2):60–64, Feb. **1951.** 7 figs., 2 tables, 9 refs. **DWB**—This article briefly summarizes the results of ionospheric studies carried out at Calcutta from 1949 to 1950. These consist of: determination of the rates of electron production, temperature in the E and F2 regions, the intensity of the earth's magnetic field and effects of lunar and solar tides in the F2 region; a comparison of ionospheric changes at Calcutta with those occurring in other parts of the world; association of ionospheric changes with thunderstorms, meteoric showers, with solar eclipse and solar activity; and statistical analysis of ionospheric disturbances in the F2 region which showed a 27-day recurrence tendency. (*See item* 9–46 in Sept. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Ionosphere, Calcutta.**—*I.L.D.*

2.9–65 551.510.535:523.73

Bartels, Julius, **27-day variation in F_2 layer critical frequencies at Huancayo.** *Journal of Atmospheric and Terrestrial Physics*, 1(1):2–12, **1950.** 14 figs., 11 refs. **MH-BH**—The noon critical frequencies of the F2 layer at Huancayo 1938–46 were examined for 27-day periods with persistent sunspots asymmetric in longitude, by comparing 10-day minus 27-day means of fF2 and sunspot number and by harmonic analysis. These show good agreement, the variation in fF2 being 6–10%. The phase difference indicated a lag of 1.6 days but this is not statistically significant. The lunar 14.77-day period is comparable and often larger than the sunspot effect. *Subject Headings:* **Ionosphere, Sunspot effects, Lunar tides.**—*C.E.P.B.*

2.9–66 551.510.535:551.521.64:550.385

Müller, Rolf, Augustin, Otto, Menzel, Willi and others, **Solare und terrestrische Beobachtungen während des Mögel-Dellinger-Effektes (SID) am 19. November 1949.** [Solar and terrestrial observations during the Mögel-Dellinger effect (SID) on November 19, 1949.] *Journal of Atmospheric and Terrestrial Physics*, 1(1):37–48, **1950.** 9 figs., table, 18 refs. **MH-BH**—A bright chromosphere eruption began Nov. 19, 1949 at 10h. 34 min. Cosmic radiation shown by ionizing effect or counter coincidences at several stations increased by 10–20% in 10–20 min., confirming earlier observations. Echo soundings on 1–16 MHz gave no reflection from E layer and none from F at lower frequencies. Echoes on 1800 KHz failed at 10.30 and field strength of transmission on 6078.9 KHz from 400 km. fell nearly to zero at 10.50. Geomagnetism showed no special disturbance so that slow corpuscles from the eruption failed to reach the earth. *Subject Headings:* **Solar flares, Cosmic radiation, Radio fading, Ionosphere.**—*C.E.P.B.*

2.9–67 551.510.535

Nicolet, Marcel, **Effects of the atmospheric scale height gradient on the variation of ionization and short wave absorption.** *Journal of Atmospheric and Terrestrial Physics*, 1(3): 141–146, **1951.** 2 tables, 3 refs., 35 equations. **MH-BH**—The local "scale height" H for any active constituent of the atmosphere depends on its concentration and absorption coefficient and the solar zenith distance. Author calculates effect of variation of H on certain theoretical characteristics of the ionosphere, including variation of critical frequency with height of sun, short wave absorption, absorption of solar radiation and electronic recombination. *Subject Headings:* **Ionosphere, Microwave absorption.**—*C.E.P.B.*

2.9–68 551.510.535:523.78

Stranz, Dietrich, **Die Ionosphäre der partiellen Sonnenfinsternis am 28. April 1949.** [The ionosphere during the partial solar eclipse of April 28, 1949.] *Zeitschrift für Naturforschung*, 5a(3):172–173, [1950]. fig., ref. Reprint available. **MH-BH**—Maximum of eclipse (0.37 of disc) at Göteborg 7h.32. Critical frequency of F2 layer rose sharply at sunrise and continued to 10h. At beginning of eclipse echoes from D layer (87 km.). Both attributed to shading of corona and disturbance of density. *Subject Headings:* **Ionosphere, Solar eclipses.**—*C.E.P.B.*

2.9–69 551.510.535:551.594.51

Vegard, L., **Report on recent investigations dealing with solar and terrestrial relationships.** *Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres, Sixième rapport*, Orléans, France, p. 186–190, **1948.** **MH-BH**—Short summary of papers by author on spectral analysis of aurora. *Subject Headings:* **Ionospheric layers, Auroral spectra.**—*C.E.P.B.*

2.9–70 551.510.535:621.396(04)

Waynick, A. H., **The conference on ionospheric research (held at Pennsylvania State College . . . June 27–28–29, 1949).** *Journal of Geophysical Research*, 54(3):281–288, Sept. **1949.** **MH-BH**—Summaries of 12 papers mostly on effect of ionosphere layers on waves of various lengths. Papers indexed separately. Symposia summarized by A. H. Waynick include: Long-wave propagation; Physical bases of Appleton-Hartree dispersion equation; Auroral region studies; Ionospheric absorption, theory and measurement. *Subject Headings:* **Ionospheric research, Radio communication, Symposia.**—*C.E.P.B.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

2.9–71 551.511:37

Klebba, Arthur A. and Stommel, Henry, **A simple demonstration of Coriolis force.** *American Journal of Physics*, 19(4):247, April **1951.** **DWB**—A simple apparatus useful in teaching dynamic meteorology or oceanography is described briefly and illustrated. *Subject Headings:* **Coriolis force, Teaching aids.**

2.9–72 551.511:532.5

Long, Robert R., **Research on experimental hydrodynamics in relation to large-scale meteorological phenomena.** *Chicago, University, Dept. of Meteorology, Progress Report* No. 5, Jan. **1951.** 55 leaves. 20 figs., 13 refs., equations. **DWB**—Main body of report consists of article by author entitled "A theoretical and experimental study of the motion and stability of certain atmospheric vortices," (p. 16-85). Experiments with a rotating, spherical shell, containing two immiscible liquids indicate that a cyclone centered near the pole tends to stay near the pole, while an anticyclone tends to be displaced towards the equator. Other aspects of vortex behavior are considered theoretically and experimentally. *Subject Headings:* **Mechanics of the atmosphere, Hydrodynamics, Vorticity, Rotating spherical shells.**—*M.R.*

2.9–73 551.511

Truesdell, Clifford A. T., **On Ertel's vorticity theorem.** *Zeitschrift für angewandte Mathematik und Physik*, 2(2):109-114, March **1951.** fig., 13 equations. In English, German summary p. 114. **DWB**—A generalization by ERTEL of SILBERSTEIN's vorticity theorem is discussed and applied to viscous compressible fluids. A special application is to the flow of an incompressible inhomogeneous fluid, in which, as the density becomes more nearly uniform, the vorticity increases without limit. *Subject Heading:* **Vorticity theory.**—*C.E.P.B.*

2.9–74 551.511

Van Mieghem, Jacques, **Note on energy transformation functions.** *Journal of Meteorology*, 8(2):131–132, April **1951.** 6 refs. Reply by James E. Miller p. 132–133. **MH-BH**—A criticism of a recent paper by J. E. MILLER entitled "Energy transformation functions," wherein PROF. VAN MIEGHEM maintains that the classical notions of "heat received, energy increase and work done by a system" cannot be used for open systems as readily as for closed systems. He also takes exception to certain assumptions with respect to a moving bounding surface. In his reply, J. E. MILLER agrees with some of the remarks and disagrees with others. *Subject Headings:* **Dynamics of the atmosphere, Energy transformation.**—*M.R.*

GENERAL CIRCULATION

2.9–75 551.513:551.557

†Bilancini, Raoul, **La "corrente a getto."** [The jet stream.] *Rivista di Meteorologia Aeronautica*, 10(3):3–13, July–Sept. **1950.** 6 figs., 32 refs. Italian, French, English and German summaries p. 3. **MH-BH**—Beginning with information furnished by MCTAGGART-COWAN in his recent paper on the jet stream, the author presents a review of the history of application of the *jet stream* concept to the zone of maximum westerlies in the upper troposphere. Credit is given to WILLETT, ROSSBY, PALMÉN and many others. Charts of North America and the Northern Hemisphere, showing position and nature of jet stream (taken from those prepared by RIEHL, NAMIAS and other Americans), are reproduced. Application to forecasting. Several recent German papers on the jet stream are mentioned. *Subject Headings:* **Jet stream, Progress in meteorology.**—*M.R.*

2.9–76 551.513

Bugaev, V. A., **B. L. Dzerdzeevskiĭ. Tsirkuliatsionnye skhemy v troposfere tsentral'noĭ Arktiki.** [B. L. Dzerdzeevskiĭ. Circulation patterns in the troposphere of the Central Arctic.] *Meteorologiia i Gidrologiia*, No. 3:84–85, **1947.** **DWB**—In a review of B. L. DZERDZEEVSKIĬ's paper, based on recent data obtained by explorers of the Arctic (mainly from the drifting station "Severnyĭ Polius"), the author writes that the principal merit of the study consists in including the Arctic in the synoptic routine. The study proved that, contrary to the classical notion, all the circulation and physical patterns of the troposphere of more southern latitudes exist in the Arctic nearly up to the Pole; changes of weather in the Arctic are also connected with changes of air masses and atmospheric disturbances (cyclones and anticyclones). Notwithstanding his disagreement with some of DZERDZEEVSKIĬ's particular opinions, the author considers the publication as a matter of great importance. *Subject Headings:* **General circulation, Reviews, Boris L. Dzerdzeevskiĭ, Arctic Basin.**—*C.K.*

2.9–77 551.513:551.557

Jet winds rule the weather. *Science Digest*, 29(5):65–66, May **1951. DWB**—Description of jet stream which is called a "Gulf Stream" five miles above the ground. *Subject Heading:* **Jet stream.**

2.9–78 551.513

Kao, Y. S., **General circulation of the lower atmosphere over the Far East.** *Academia Sinica, Institute of Meteorology, Memoirs*, 16(1), July 1948. 7+p. 12 figs., 10 refs. **DLC**—On the basis of pilot balloon data, obtained at 28 stations in China and other data published by the Zi-Ka-Wei Observatory and elsewhere in the Far East, the author has constructed upper air flow patterns at 7000 ft., 10,000 ft. and 15,000 ft. levels for every month of the year. The characteristics of the air circulation at various places and seasons are described in detail. *Subject Headings:* **General circulation, East Asia.**—*I.L.D.*

2.9–79 551.513:532

Lahaye, Edmond, **Contribution à la résolution des équations du mouvement d'un fluide et des équations de la circulation atmosphérique générale.** [Contribution to the solution of equations of motion of a fluid and of the general atmospheric circulation.] *Belgium, Institut Royal Météorologique, Memoires*, Vol. 38, **1950.** 78 p. refs., 23 equations. **MH-BH**—The first part consists of a development of the integral equations for permanent motion, first for a perfectly homogeneous incompressible fluid, a perfect barotropic fluid and, finally, for a viscous incompressible fluid. The second part takes up the non-permanent movements for the same three special cases, and in part three relative motion is treated briefly. *Subject Headings:* **General circulation, Fluid mechanics, Equations of motion.**—*M.R.*

2.9–80 551.513:551.557

†McTaggart-Cowan, P. D., **The jet stream.** *Royal Meteorological Society, Canadian Branch, [Publications]*, 1(1), Jan. **1950.** 37 leaves. 31 figs., 32 refs. Mimeographed. **DWB**—A survey of the more important published works leading up to or dealing with the physics of the jet stream. The historical section begins with Rossby (1936); the "Fundamental papers" begin with Rossby (vorticity theory) and Namias (confluence of cold and warm currents), both in 1947. Illustrated by numerous cross sections, surface and upper air charts, etc. Ends with a summary of the physical properties of the jet stream defined as a narrow zone of extremely strong winds in the upper troposphere. *Subject Heading:* **Jet stream.**—*C.E.P.B.*

2.9–81 551.513(74,75)

§Miller, Albert and Vederman, Joseph, **Blocking action over the Northeast during the latter half of February 1951.** *Monthly Weather Review*, 79(2):39–44, Feb. **1951.** 16 figs., 7 refs. **DWB**—A case of blocking action that began in the western Atlantic in mid-February 1951 is analyzed by means of surface and upper level synoptic charts and soundings. The 3-day mean profiles of zonal speed are shown in relation to the normal profile, and the zonal index from day to day plotted. The evolution, deterioration and effect on movement of cyclones is discussed. *Subject Headings:* **Blocking action, Atlantic States, Zonal index.**—*M.R.*

2.9–82 551.513:551.543

§Moene, Asmunn, **Atmospherical solenoids and sea level pressure variations.** *Meteorologiske Annaler*, 3(6):157–189, **1950.** 35 figs., 4 refs., 7 equations. In English. **DWB**—The relationship between isallobaric areas on synoptic charts and atmospheric isosteric-isobaric solenoids is investigated by means of the tendency equation from the point of view that the solenoids represent the primary energy source of atmospheric disturbances. The tendency equation is derived. It is shown that changes in isallobaric minimum and maximum can be forecast in the case of thermal quasi-symmetry, involving release of kinetic energy and in the case of mixtures there. *Subject Headings:* **General circulation, Solenoids, Pressure variations.** —*I.L.D.*

2.9–83 551.513

Tao, Shih-yen, **The mean surface air circulation over China.** *Academia Sinica, Institute of Meteorology, Memoirs*, 15(4), July 1948. 7+p. 12 figs., 23 refs. **DLC**—With the aid of

mean monthly surface stream line charts for the Far East and surrounding seas, based on wind data averaged monthly for a five year period, the author describes the principal features of the circulation over the Far East, in particular China. Sink, source divergence and convergence lines are considered. The data used are based upon 70 stations in China, 45 stations in Siberia, 20 stations in Japan, 20 stations in the Philippines and 30 stations in Indo-China. *Subject Headings:* **General circulation, China, East Asia.**—*I.L.D.*

2.9–84 551.513:551.557

Wexler, Harry, **Spread of the Krakatoa volcanic dust clouds as related to the high-level circulation.** *American Meteorological Society, Bulletin*, 32(2):48–51, Feb. **1951.** 2 figs., 7 refs. **MH-BH**—An analysis of general circulation factors responsible for the slow spread of the volcanic ash cloud of the Krakatoa explosion *toward* the poles, compared with its rapid spread *around* the earth. It took from Aug. to Nov. (3 months) for the large scale eddy diffusivity (operating at lower and lower latitudes as winter advances) to catch the dust cloud in the Northern Hemisphere westerlies and bring it over the United States and Europe. Scheme is based on 19 km. mean monthly circulation charts. *Subject Headings:* **Meridional circulation, Upper air winds, Volcanic dust, Krakatoa winds.**—*M.R.*

ATMOSPHERIC DISTURBANCES

2.9–85 551.515.11

Sato, Tadasi, **The structure of stationary discontinuous surface, I, II, III.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(7, 10, 12):242–248; 376–384; 383–384, July, Oct., Dec. **1950.** 27 equations. In Japanese, English summaries p. 247–248, 383–384, 431–432. **MH-BH**—Author examines mathematically motion at a stationary surface of discontinuity in an autobarotropic frictionless medium. The vertical section through the discontinuity is approximately a parabola (agreeing with MARGULES) and the motion is spirally around a cylinder. The result is applied to motion in a cyclone, a horizontally rotating current is necessarily accompanied by convection. In Pt. II the equations developed in Pt. I are solved for motion at a discontinuity surface, treated as a fluid, bordered by simple boundaries. The vertical section of the surface is shown to be a parabola. In Pt. III the shape of the discontinuity is further discussed using its intersection with the earth's surface as origin. The position of the vortex depends on the characteristics of the air on either side of the discontinuity. *Subject Headings:* **Cyclone structure, Discontinuity surfaces.**—*C.E.P.B.*

2.9–86 551.515.2

Tannehill, Ivan Ray, **Ill winds.** *Americas*, Washington, D. C., 3(3):6–9, 31, March **1951.** 8 photos. **DWB**—Although hurricanes cannot be prevented, much is being done to cut down the loss of life and destruction of property by storm warnings and automatic weather stations. Property damage can be reduced by better construction of buildings and protective measures, such as boarding up windows. This is a popular article which also contains a short history with illustrations of the worst catastrophes. *Subject Headings:* **Hurricanes, Hurricane forecasting.**—*W.S.*

2.9–87 551.515.2(263)(72)(75)

§U. S. Navy Aerological Service, **Hurricanes and tropical storms of 1947 Atlantic area.** Washington, D. C., March **1948.** 119 p. numerous synoptic charts. (NAVAER50-1R-218). **DLC**—Nine hurricanes that invaded the West Indies, Gulf of Mexico or SE United States during 1947 are analyzed and described in detail. Full page synoptic charts are reproduced for every six hour period during the life of each storm. Track of each storm is shown individually and on a composite chart for the entire season. *Subject Headings:* **Hurricanes, West Indies, Caribbean Sea.**—*M.R.*

2.9–88 551.515.227:551.513

Syono, Sigekata, **On the structure of atmospheric vortices.** *Journal of Meteorology*, 8(2):103–110, April **1951.** 7 figs., 12 tables, 3 refs., 37 equations. **MH-BH**—Using the vorticity and circulation theorems, the author derives the equations for the formation of the region of negative relative vorticity in the area of a typhoon and verifies the theory from an

example of the Okinawa typhoon of 1924. Next he deals with the latitudinal effect on the absolute circulation, the sense of rotation in the upper levels, the generation of the eye, the inferences from the initial positions of the concentric air rings and the observed vorticity distribution. *Subject Headings:* **Typhoon structure, Okinawa typhoon (1924), Vorticity theory.**—*M.R.*

2.9–89 551.515.3

Attwood, G. D. and others, **Waterspouts.** *Marine Observer*, 21(152):77–79, April 1951. 4 figs. **DWB**—Two spouts seen in 5°N., 12°33′W. April 6, 1950, tubular, 40 and 20 ft. diameter rotating clockwise; excellent photos, but clouds were not visible on radar screen. Other reports of spouts by A. W. Ford (59°13′N., 19°W.), clockwise rotation; G. E. Mitchell (7°34′N., 76°18′W.) and N. C. Pascoe (10°9′N., 87°24′W.), sketch. *Subject Headings:* **Waterspouts, Gulf of Guinea.**—*C.E.P.B.*

2.9–90 551.515.3:551.501.81

Tepper, Morris, **Radar and synoptic analysis of a tornado situation.** *Monthly Weather Review*, 78(9):170–176, Sept. 1950. 7 figs., 2 tables, 4 refs. **DWB**—The analysis of precipitation echoes indicated by radar picture of the tornado of Nov. 14, 1949 at Pierson, Florida, and of the synoptic data for the southeastern United States, associated with it, supports the hypothesis that the interaction zone of two intersecting pressure jump lines is a preferred region for the formation of tornadoes. The mechanism of a "backward" moving pressure jump line is suggested as the cause of the pressure jump line. However, microbarograph data did not verify satisfactorily the tornado hypothesis. *Subject Headings:* **Tornado formation, Radar storm detection.**—*I.L.D.*

2.9–91 551.515.7:551.555(728,866)

§Alpert, Leo, **An atmospheric cross-section over the tropical eastern Pacific during a strong norther, November 16, 1942.** *American Meteorological Society, Bulletin*, 32(3):97–101, March 1951. 3 figs., 12 refs. **MH-BH**—On Nov. 9–16, 1942 a strong polar air mass moved down over Mexico and Central America (to the right of a hurricane) reaching to within 5°N. of the equator. Details of wind, cloud and air mass conditions are given, with a brief account of unusual features and pilots' reports, especially for the intertropical convergence zone centered on the Galapagos Islands. *Subject Headings:* **Anticyclones, Northers, Central America, Galapagos Islands.**—*M.R.*

2.9–92 551.515.8:551.547

Crawford, E. Marion, **A synoptic study of instability lines.** *American Meteorological Society, Bulletin*, 31(10):351–357, Dec. 1950. 3 figs., table, 7 refs., append. **MH-BH**—A procedure for predicting the approximate locality, time of occurrence and strength of instability lines, influencing the southeastern States during the spring, is formulated. A series of constant-pressure charts that are associated with the development and life cycle of the pre-cold frontal instability line is based upon advective temperature changes at 800 and 750 mb., which bring about warm and cold tongues and upon the resultant elongated zone in the fore-part of the associated trough. "The instability line develops along the axis of a warm tongue at 850 mb. after cold air advection at 700 mb. has reached the fore part of the associated trough and is advancing at a more rapid rate than the warm tongue." The results of the study of twenty-eight cases of instability lines are presented. No pre-cold instability lines of any significance were observed over the southeastern States without the warm tongue at 850 mb. and strong cold air advection in the fore trough at 700 mb. *Subject Headings:* **Squall lines, Cold fronts.**—*I.L.D.*

2.9–93 551.515.8(51)

Jong, Pin-chen, **Chinese air mass analysis.** *Academia Sinica, Institute of Meteorology, Memoirs*, 15(3), June 1948. 17 p. 4 figs., 12 tables, 11 refs. **DLC**—A classification of Chinese air masses by maritime, continental and by local source region and a detailed description of their characteristics by season are presented. Charts of the mean monthly air stream at 7,000 and 10,000 feet in January and July are presented. *Subject Headings:* **Air masses, China.**—*I.L.D.*

RADIATION AND TEMPERATURE

COSMIC RADIATION

2.9–94 551.521.64

Alpher, R. A., **Theoretical geomagnetic effects in cosmic radiation.** *Journal of Geophysical Research*, 55(4):437–471, Dec. **1950.** 8 figs., 16 refs., 50 equations. **MH-BH**—The theory of geomagnetic effects upon the motion of cosmic rays is reviewed. The equations of motion are developed and the various classes of trajectories of cosmic ray particles are discussed. The determination of the Störmer cone and of the main cone, shadow cone and penumbra are presented. Procedures are given for reducing the cone diagrams to more easily usable graphical forms. "Conversion procedures involved in the application of the theory are presented." "The material presented includes curves of minimum energy of arrival, as measured in Störmer units, versus azimuth angle, for zenith angles at 10° intervals, arising from the combined Störmer and shadow cone (for all latitudes at 10° intervals) and from the main cone (at latitudes 0°, 20° and 30°). Minimum momentum is BeV/c and minimum energy is BeV for protons and heavy nuclei are given versus geomagnetic latitudes for azimuth, N, S, E and N at all zenith angles in 15° steps." *Subject Heading:* **Cosmic radiation.**—*I.L.D.*

2.9–95 551.521.64:621.812

Dolbear, D. W. N., Elliot, H. and Dawton, D. I., **The cosmic ray intensity and radio fade-outs.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):187–188, **1951.** 6 refs. **MH-BH**—The effect of small solar flares, causing short radio fade-outs on cosmic ray intensity, was examined by superposing curves of cosmic radiation at Manchester before, during and after 35 fadeouts between 9 h. and 16 h. S.M.T. and 69 between 16 h. and 9 h. Daytime results showed an increase of cosmic rays by 0.3% at time of fadeout; at night this effect did not appear. *Subject Headings:* **Cosmic ray intensity, Radio fading.**—*C.E.P.B.*

2.9–96 551.521.64:537.59

George, E. P. and Jason, A. C., **Observations on cosmic-ray penetrating showers at high altitude, sea level and below ground.** *Physical Society of London, Proceedings A*, 63:1081–1097, **1950.** 5 figs., 8 tables, 27 refs., 8 equations. **DWB**—To study absorption of primary radiation responsible for cosmic ray showers, observations were made 30 m. below ground and at sea level in London and at 3457 m. in Switzerland. The apparatus and its correction for "geometry" are described. Results with absorbing layers of lead, aluminum and paraffin are discussed. It is concluded that most of the penetrating particles appear to be generated in the atmosphere. The results at sea level and 3457 m. are similar; no penetrating showers were recorded below ground in 40 days. *Subject Heading:* **Cosmic ray showers.**—*C.E.P.B.*

2.9–97 551.521.64:551.586

Hess, Victor F. and Eugster, Jakob, **Cosmic radiation and its biological effects.** New York, Fordham University Press, [1949]. 178 p. 32 figs., 6 tables, numerous refs., equations. **DLC**—This monograph is a complete review of the physics of cosmic radiation and of its effect upon living tissues. Dr. Victor F. Hess discusses the physics of cosmic radiation in chapters dealing with methods of measurement, distribution of intensity and of the direction of cosmic radiation in the atmosphere and below the surface of the earth, geographic distribution of cosmic ray intensity and influence of the earth's magnetic field, the energy spectrum of cosmic rays, the interaction of cosmic rays with matter, variations of cosmic rays with time (temperature effect, diurnal variations with solar and sidereal time and seasonal time, etc.) and the composition and origin of cosmic radiation. Dr. Jakob Eugster reviews the literature on the effects of cosmic radiation upon the growth of unicellular organisms, upon the mutation rate of *Drosophila melanogaster* and upon cancer incidence in mice. He also describes his own experiments on the effect of cosmic ray showers upon living organisms. The author concludes that cosmic radiation has a definite effect upon living tissues: it is characterized by an initial stimulation of growth followed by an inhibitory phase—and that it stimulates tumor growth in white mice. A mechanism for the biologic action of cosmic rays is described. *Subject Headings:* **Cosmic radiation, Bioclimatology.**—*I.L.D.*

2.9–98 551.521.64:551.590.21

Hogg, A. R., **Cosmic rays and solar relationships.** *Journal of Atmospheric and Terrestrial Physics*, 1(1):56–62, **1950.** 6 figs., table, 16 refs. **MH-BH**—Cosmic ray intensities measured with ionization chamber at Canberra were compared with solar phenomena. An apparent 27-day recurrence is traced to an indirect relation through geomagnetism. No definite relation was found to sunspots or chromosphere eruptions unless accompanied by magnetic disturbance. *Subject Headings:* **Cosmic ray intensity, Solar relations.**—*C.E.P.B.*

2.9–99 551.521.64

Hogg, A. R., **Some time variations of cosmic rays.** *Journal of Atmospheric and Terrestrial Physics*, 1(2):114–120, **1950.** 2 figs., 3 tables, 16 refs. **MH-BH**—Five years of cosmic ray observations made at Canberra are analyzed and compared with results obtained in other longitudes to determine whether variations occur with sidereal factors or with solar or seasonal changes. The conclusion is that the solar-seasonal factor is the principal one. This analysis confirms results obtained by FORBUSH, showing that variations with sidereal time amount to only 0.1% or less at Cheltenham (595 days) and Huancayo (395 days). *Subject Headings:* **Cosmic ray variations, Canberra, Australia.**—*M.R.*

2.9–100 551.521.64

Rathgeber, H. D., **Remarks on the latitude effect of cosmic rays at sea-level.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(2):183–192, June **1950.** 3 figs., 2 tables, 24 refs., 9 equations. **MH-BH**—The intensity of cosmic radiation was measured with several Geiger counter telescopes of different designs during a voyage from Australia to Japan. Formulas for determining the cosmic ray intensity for a zenith angle with a spherical ionization chamber with a narrow angle coincidence telescope and with a wide angle coincidence telescope are given. The latitude effect of cosmic rays at sea level (averaged over all azimuths) is approximately proportional to $\cos^{2}1.2\zeta$, where ζ is the zenith angle of the incident radiation and the latitude effect for rays of vertical incidence averages 18 percent. After correction for longitude and zenith angle, Geiger counter telescope and ionization measurements do not differ by more than their errors of measurements; the average specific ionization does not vary with latitude. From the dependence of latitude effect upon zenith angle it is shown mathematically that the zenith angle distribution of cosmic rays, measured at a fixed location, varies with latitude. The equality of latitude effect for mesons and for electrons and the latitude effect of extensive showers are explained qualitatively. *Subject Heading:* **Cosmic ray intensity.** —*From author's abstract.*

2.9–101 551.521.64

Rose, D. C., **Meteorological effects on cosmic ray intensity and the meson spectrum.** *Canadian Journal of Physics*, 29(2):97–110, March **1951.** 4 figs., table, 18 refs. **DWB**—The apparatus for continuous recording of the hard component of cosmic rays at Ottawa and at Resolute in the Canadian Arctic and the method of analysis for determining the barometric effect are described. The observations gave a barometric coefficient of -1.75% per cm. of mercury for mesons with momenta above 350 Mev./c and -2.13% per cm. of mercury for those with momenta above 630 Mev./c. A theoretical calculation of temperature and barometer effects was made. Calculation of the temperature coefficient did not give results comparable with measurements; calculation of barometric effect showed that measurements of barometer coefficients provides information on the meson spectrum. *Subject Headings:* **Cosmic ray observation, Meson decay, Ottawa, Canadian Arctic.**—*I.L.D.*

TEMPERATURE

2.9–102 551.524:635

Ribaldi, Mario, **Influenza della temperatura sullo sviluppo della *Monilia fructigena* pers. su frutti di mela.** [The influence of temperature on the development of *Monilia fructigena* in apple fruit.] *Rivista di Ecologia*, 1(5–6):268–278, **1950.** 7 plates, 3 refs. Italian and English summaries p. 277–278. **DWB**—The optimum temperature for the growth and propagation of the mold *Monilia fructigena* grown in apples is between 22–25°C. *Subject Headings:* **Temperature, Horticulture.**

2.9–103 551.524.2:551.515(54)

Malurkar, S. L., **Surface wet bulb potential temperatures in and near India—Normal values and a study in disturbed weather.** *Indian Journal of Meteorology and Geophysics*, 2(1):25–40, Jan. **1951.** 27 figs., 13 refs., equations. **MH-BH**—The use of the surface wet bulb potential temperature for identifying air masses in India is recommended. Charts of normal wet bulb temperatures in India for twelve months are presented. Wet bulb potential temperature charts during a pre-monsoon cyclonic storm in 1930 over India are given and by their means the various air masses entering India are analyzed. The author also shows the derivation of Normand's wet bulb potential temperature from Rossby's equivalent potential temperature. *Subject Headings:* **Air masses, Potential temperature, Temperature distribution, Atmospheric disturbances, India.**—*I. L. D.*

2.9–104 551.524.3:551.578.4:551.583.3

Berg, Hellmut, **Beziehungen zwischen Temperatur- und Niederschlagsanomalien.** [Relations between temperature and precipitation anomalies.] *Geofisica Pura e Applicata*, 14(3–4):173–188, April–June **1949.** 9 figs., 4 tables, 12 refs. German, English and French summaries p. 173–174. **DWB**—Several ice age theories assume a positive relation between temperature and snowfall in winter. Author investigates this empirically. At low and high level stations in Europe and Greenland there is no systematic temperature difference on days with and without precipitation. In 3 winter months correlation between mean temperature and total precipitation is positive at 44/64 stations mostly in north Atlantic region, but at Solingen correlation between winter temperature and depth or duration of snow cover is —.6. No ice age theory can be erected on this basis. *Subject Headings:* **Temperature anomalies, Precipitation anomalies, Glacial periods.**—*C.E.P.B.*

2.9–105 551.524.4:551.571.4

Gerhardt, John R., **Temperature and moisture soundings over the Gulf of Mexico for March, 1949.** *American Geophysical Union, Transactions*, 32(1):15–25, Feb. **1951.** 9 figs., table, 11 refs., 2 equations. **MH-BH**—Heat and moisture transfer processes over the ocean are investigated on the basis of a series of four-hourly soundings between the sea surface and 45 feet (above the surface) in the Gulf of Mexico off Freeport, Texas. Comparative moisture values are shown for various levels in a series of graphs. Observations compare favorably with previous determinations for variation of evaporation coefficient with wind speed and for logarithmic distribution of water. *Subject Headings:* **Heat and moisture transport, Energy exchange, Gulf of Mexico.**—*M.R.*

2.9–106 551.524.7 551.557

*Bushev, I. M., **Aerologicheskaia kharakteristika Sverdlovska.** [Aerological characteristics of Sverdlovsk.] Sverdlovsk, Magnitnaia i Meteorologicheskaia Observatoriia, 1836–1936; Iubileĭnyĭ Sbornik, **1936.** p. 227–253. 5 figs., 12 tables, 2 refs. English summary p. 252–253. **DLC**—The paper consists of two sections. The first, based on data from 157 kite ascents, deals with the temperature of different strata of the troposphere up to 3 km. in various seasons. The second section analyzes the regime of winds also up to 3 km. The data have been obtained by 847 pilot balloon ascents. The author does not consider the data as conclusive, but only as reference material for workers in air transportation. *Subject Headings:* **Upper air temperatures, Upper air winds, Upper air data.**—*C.K.*

ATMOSPHERIC PRESSURE AND WIND

PRESSURE

2.9–107 551.543

Dedebant, G., Di Maio, R. and Lutzow-Holm, O., **Enseñanzas de una nivelación barométrica.** [Experiences in barometric levelling.] *Meteoros*, Buenos Aires, 11(1):55–72, Jan. **1951.** 3 figs., 9 tables, equations. **DWB**—Temperature and pressure observations made on a trip from Jujuy to La Quiaca, and sixteen intermediate heights by means of the barometric formula. For the journey to La Quiaca, during which good weather prevailed, results agree

reasonably well with the values of elevation determined geometrically. For the return trip, made in rainy weather, the large deviations from the geometric values cannot be explained by the horizontal pressure gradient, station pressure tendencies, or the synthetic mean temperatures of the vertical columns and are ascribed to erratic microseisms which the author terms "pressure turbulence." *Subject Heading:* **Barometer reduction.**—*R.S.Q.*

2.9–108 551.543(494)

Eggenberger, Sigmund, **Beiträge zu den Untersuchungen des Luftdrucks in der Schweiz.** [Contributions to investigations of atmospheric pressure in Switzerland.] Zürich, Leemann, **1944.** 46 p. 31 tables, 15 diagrs. **DLC**—The daily and seasonal variations in pressure for several Swiss stations are analyzed statistically and the peculiarities of the resulting curves discussed. Pressure conditions on days with upslope and föhn effects are treated in detail (three types of upslope weather are distinguished). Frequencies of winds from various directions and the effects thereof are tabulated. *Subject Headings:* **Pressure variations, Föhn effects, Switzerland.**—*M.R.*

2.9–109 551.543.1:551.524.31

Bjerknes, Jacob, **Atmospheric tides.** *Journal of Marine Research*, 7(3):154–162, **1948.** 4 figs., 6 refs. **DLC**—The mechanism of the large 12 h. pressure oscillation is related to the real 12 h. wave of temperature. Above 2 km. the phase of the temperature wave does not change with height but the pressure wave lags towards phase coincidence with it. The great amplitude of 12 h. pressure wave is due to this tilt in space. The tidal wind reaches its maximum when the forces of friction and pressure gradient are equal and opposite, and the pressure oscillation will maintain an intensity such that they balance. The 24-hour pressure wave is not tilted and is therefore not intensified. *Subject Heading:* **Atmospheric tides.**—*C.E.P.B.*

2.9–110 551.547.1

Landi, Alessandro and Giallombardo, Carlo, **Conversione dei valori QFE in QNH e viceversa per il regolaggio degli altimetri.** [Conversion of QFE into QNH values and vice versa for correcting altimeters.] *Rivista di Meteorologia Aeronautica*, 10(3):23–25, July–Sept. **1950.** Italian, French, English and German summaries p. 23. **MH-BH**—A circular slide rule is described and illustrated for quickly reducing station (airport) barometric pressure to standard pressure for use in altimeter corrections on board a plane, or vice versa. Other methods and their disadvantages are described. *Subject Headings:* **Altimeter corrections, Slide rules.**—*M.R.*

WIND

2.9–111 551.556:551.468.2

Romanovsky, Vsevolod, **Influence du vent sur les courants superficiels de la baie de Nice.** [Influence of wind on the surface currents of the bay of Nice.] *Académie des Sciences, Paris, Comptes Rendus*, 232(9):870–872, Feb. 26, **1951.** 2 figs., 2 refs. **DWB**—On the basis of 7200 current measurements made between Cape Ferrat and Cape Antibes in the summers of 1949 and 1950, the effect of the wind in producing large eddies in surface currents was established. During good weather there are no eddies, but when the mistral (winds from NW to SW) blows these eddies form and increase in size with increasing force of wind, finally merging to form a countercurrent. Schematic diagrams show the currents during good weather and during this mistral, respectively. *Subject Headings:* **Ocean currents, Wind waves, Mistral, Bay of Nice, France.**—*M.R.*

2.9–112 551.556:551.46:532.59

Shipov, N. D., **Volnenie Nevskoĭ Guby.** [Wave action at the mouth of the Neva.] *Meteorologiia i Gidrologiia*, No. 3:50–58, **1947.** 7 figs., 5 tables, 14 equations. **DWB**—An important paper in which the author presents an analysis based on observations carried out in August–October 1935 and 1936, and June–October 1945. It contains data on the height and length of waves, direction and velocity of wind, and the relation between these elements. The relationship between wind speed and wave height for various wind directions and wave types is shown graphically. *Subject Headings:* **Wind waves, Neva River, U.S.S.R.**—*C.K.*

2.9–113 551.556.2:69

Sekiguchi, T., **Rural houses and prevailing winds.** *Papers in Meteorology and Geophysics,* Tokyo, 1(1):67–76, Oct. **1950.** 7 figs., 3 tables. In English. **MH-BH**—In the Ina Valley of Japan strong south winds predominate, north winds and west gales are also frequent. The majority of houses face east instead of south as is usual in Japan. Houses are also protected by outhouses such as woodsheds to S. and N. with pent roofs and by windbreaks. Houses are mostly low built. Plans and sketches given. *Subject Headings:* **Wind damage prevention, Building design, Japan.**—*C.E.P.B.*

2.9–114 551.557.3:551.547

*Sarma, Vittal V., **Comparison of geostrophic winds on constant pressure surface with observed winds in India.** *Indian Journal of Meteorology and Geophysics,* 2(1):41–47, Jan. **1951.** 3 figs., 7 tables, 14 equations. **MH-BH**—A quantitative method for comparing geostrophic winds, constructed from the contours of constant pressure surfaces with observed wind directions and velocities, is presented. It consists of considering the wind at each pilot balloon station to represent the wind conditions half-way up to the next pilot balloon station and the path between pilot balloon stations is integrated as close as possible to a straight line by the method of summation. The differences in the heights of constant pressure surfaces between five pairs of stations in India, using upper wind data for 850 mb. and 700 mb., have been calculated and differences determined from the data of radiosonde ascents. The correlations between the two sets of values are lower in India than for similar correlations in the British Isles. *Subject Headings:* **Upper wind variations, Upper air pressure, Radiosonde data, India.** —*I.L.D.*

2.9–115 551.558:551.515.8

Faust, Heinrich, **Atmosphärische Fronten und Vertikalaustausch.** [Atmospheric fronts and vertical exchange.] *Geofisica Pura e Applicata,* 19(1–2):52–59, Jan.–March **1951.** table, 15 refs. German and English summaries p. 52. **DLC**—Five types of cold fronts and 2 types of warm fronts, based on vertical temperature gradients or stability (*see item* No. 9–68 in Sept. 1950 *Meteorological Abstracts*), have been described by the author. The vertical exchange (austausch) and the oxidation values of the air in the frontal zone have been determined for the surface layer of air and the contrast between the various frontal types shown to be as striking for these factors as for other meteorological elements. *Subject Headings:* **Austausch, Fronts, Hamburg.**—*M.R.*

2.9–116 551.558:551.511

§Masuda, Y., **On the method of computing vertical motion in the atmosphere (1st, 2nd and 3rd report).** *Papers in Meteorology and Geophysics,* Tokyo, 1(1):1–28, Oct. **1950.** 15 figs., 4 refs., 58 equations. In English. **MH-BH**—Large scale slow vertical air motion can be computed in three ways: 1) from change of horizontal velocity with height and of potential temperature with time at a single station, using radiosonde ascents twice daily and assuming adiabatic change of state. This gives vertical velocities up to 12 cm./sec. through a cold front over Tokyo. Not practicable when lapse exceeds 8°C./1000 m. 2) From change of lapse rate with height assuming geostrophic flow. This gave strong descending currents at 8 km. in middle of a typhoon, surrounded by strong ascending currents. 3) Integrating perturbation equations was tried but found impracticable. The third paper extends the adiabatic method to wet adiabats. This is used to give cross sections of the Kitty typhoon which throw light on its structure. Nomograms are given for making the calculations. *Subject Headings:* **Vertical motion, Mechanics of the atmosphere, Typhoons.**—*C.E.P.B.*

2.9–117 551.558.1

Langwell, Patricia A., **Forced convection cell circulation in clear air.** *American Geophysical Union, Transactions,* 32(1):7–14, Feb. **1951.** table, 10 refs., 25 equations. **MH-BH**—A study of the origin of the cloudless cells within extensive trade wind cumulus cloud areas, which are found in the West Indies. The characteristics of two-dimensional convection cells with an applied heat source are theoretically determined and compared with observations made over the ocean north of Puerto Rico. It was shown theoretically that large, slow moving cells can always exist and will persist for one or two hours. *Subject Headings:* **Convective clouds, Cumulus cloud layers, West Indies.**—*From author's abstract.*

AQUEOUS VAPOR AND HYDROMETEORS

CLOUD PHYSICS AND ICING

2.9–118 551.574.1(083.3) · 551.576.11:001.5

Kiveliovitch, M. and Roulleau, J., **Sur l'évolution des gouttes d'eau dans l'atmosphère (suite).** [On the growth of water drops in the atmosphere (cont.).] *Journal Scientifique de la Météorologie*, 3(9):1–8, Jan.–March **1951.** 3 tables, 4 refs., equations. French, English and Spanish summaries p. 1. **MH-BH**—A continuation of article (*see item* No. 7–84 in July 1950 *Meteorological Abstracts*) wherein the formula of H. G. HOUGHTON, for the growth of a drop of water, is tested and found to be accurate. It is found that theoretical results are difficult to obtain because it is not possible to measure the temperature of the drop as it falls. *Subject Headings:* **Cloud physics, Drop accretion.**—*M.R.*

2.9–119 551.574.1

Ohta, S., **On the contents of condensation nuclei and uncharged nuclei on the Pacific Ocean and the Japan Sea.** *American Meteorological Society, Bulletin*, 32(1):30–31, Jan. **1951.** 3 figs., table. **MH-BH**—Observations made with an Aitken counter on a ship for a week in Aug. 1948 in the Pacific Ocean near Japan (67 observations) and during May 1948 on the coast of Rebun Island in the Sea of Japan (115 observations) are compared. Values on the Pacific Ocean are smallest ever obtained on an ocean. No diurnal change was found over ocean—some change (increase in mid-day) over Sea of Japan. A sudden decrease was attributed to change in air mass. No change was noted with change of wind speed. *Subject Headings:* **Condensation nuclei, Saline nuclei, Sea of Japan, Western Pacific.**—*M.R.*

2.9–120 551.574.1:551.521.11

Reynolds, S. E., Hume, Wm. II, Vonnegut, Bernard and Schaefer, Vincent J., **Effect of sunlight on the action of silver iodide particles as sublimation nuclei.** *American Meteorological Society, Bulletin*, 32(2):47, Feb. **1951. MH-BH**—Short wave radiation, such as from sunlight, was found to increase the deterioration of silver iodide particles from that in dark of one order of magnitude in 24 hours, to two orders of magnitude in one hour. These results obtained in open air at Socorro, New Mexico, were duplicated in laboratory (with use of UV lamp) at Schenectady, N. Y. *Subject Headings:* **Sublimation nuclei, Silver iodide, Radiation effects.**—*M.R.*

2.9–121 551.574.1:551.577.11

Sheppard, P. A., **The physics of clouds and their precipitation.** *Endeavour*, London, 10(38):89–94, April **1951.** 4 figs., 12 refs. **DLC**—A concise, non-technical summary of the physics of cloud formation and their precipitation. The various theories on the growth of cloud droplets are discussed and evidence indicating that clouds are generally stable celloids is presented. The work of FOURNIER, FINDEISEN and of MASON on the formation of ice clouds and BERGERON's theory of precipitation and artificial precipitation are discussed. *Subject Headings:* **Cloud physics, Precipitation formation.**—*I.L.D.*

2.9–122 551.574.1:532.77

Smith-Johannsen, Robert, **Some experiments on the freezing of water.** *General Electric Research Laboratory, Occasional Report*, Schenectady, No. 3, June 1, **1948.** 7 p. fig., table, refs. **DWB**—Water normally freezes at −20°C, though when exposed to ultrasonic radiation it froze in one case at −38.5°C. By using various powders as freezing nuclei higher freezing points were obtained; with fine graphite −6.9°C. Nothing has been found which will cause water to freeze at 0°C. *Subject Heading:* **Freezing of water.**—*M.R.*

2.9–123 551.574.1

Wilson, J. G., **The principles of cloud-chamber technique.** Cambridge, University Press, **1951.** 131 p. 33 figs., 17 tables, 64 equations, biblio. p. 128–129. **DWB**—The first chapter deals with condensation and growth of drops. It contains a brief review of the early work of COULIER and AITKEN on the necessity of nuclei for condensation and a theoretical discussion

of the stability of charged drops, of the growth of drops from charged nuclei, of condensation on uncharged nuclei, of condensation in mixed vapors, of the effect of contamination, of re-evaporation nuclei and of the rate of growth of drops. *Subject Headings:* **Cloud physics, Condensation nuclei.**—*I.L.D.*

2.9–124 551.574.42

Airplane removes ice from wires. *Telegraph and Telephone Age*, New York, 69(2):22, Feb. **1951.** Further remarks by J. W. Cook, entitled: **Cook of Santa Fe suggests methods of ice and snow removal from wires.** *Ibid.*, 69(4):11, April **1951. DWB**—Heavy ice removed from miles of wires by a plane flying 100 mph at 6 feet above the wires. Later note shows ice laden telegraph wires along Santa Fe and suggests using paint which would prevent ice forming. Most effective was a wind break which kept ice off of a 2 mile section of line at distance of $\frac{1}{4}$–$\frac{1}{2}$ mile. Indians call frozen fog *Poganip*. *Subject Headings:* **Icing prevention, Ice removal, Transmission lines.**—*M.R.*

2.9–125 551.574.7

Guibert, A. G., Janssen, E. and Robbins, W. M., **Determination of rate, area, and distribution of impingement of waterdrops on various airfoils from trajectories obtained on the differential analyzer.** *U. S. NACA, Research Memorandum* No. 9A05, Feb. 16, **1949.** 53 p. 29 figs., 3 tables, 5 refs. **DWB**—Rate, area and distribution of water impingement on airfoils and cylinders determined and data presented in elaborate diagrams and tables. *Subject Heading:* **Impingement of drops.**—*M.R.*

2.9–126 551.574.42

Lafargue, Camille, **Sur la congélation des gouttelettes d'eau à l'air et à l'abri de l'air.** [On the freezing of water droplets in the atmosphere or under cover.] *Académie des Sciences, Paris, Comptes Rendus*, 230(12):1194–1195, March 20, **1950.** 2 refs. **DWB**—Experiments were conducted on the freezing point of pure water and of different solutions of salts, on wire meshes of different sizes. It was found that freezing occurs automatically at about −41°C., regardless of salinity and, hence, the freezing does not depend on condensation nuclei in the atmosphere. *Subject Headings:* **Freezing point of water, Cloud physics, Condensation nuclei.**—*M.R.*

2.9–127 551.574.7:629.13

Jones, R. F. and Beimers, J. G. D., **Distance over which an aircraft flying on a constant heading may experience severe icing in convective cloud.** *Meteorological Magazine*, London, 80(943):4–9, Jan. **1951.** 2 figs., 2 photos, table, 3 refs. **DWB**—P.P.I. of 10 cm. radar shows concentration of droplets above freezing level in cumulonimbus; this is the region where icing risk is greatest. Continuous severe icing on any particular flight in eastern England is most often 5 miles, mean value 8.3 miles, distance rarely exceeds 25 miles. Value of results limited. *Subject Headings:* **Icing of aircraft, Cumulonimbus clouds, Aeronautical meteorology.**—*C.E.P.B.*

2.9–128 551.574.7:551.509.34

Pchelko, I. G., **Ob odnom sposobe opredeleniia opasnosti obledeneniia samoleta.** [A method of determining the danger of airplane icing.] *Meteorologiia i Gidrologiia*, No. 3:63–64, **1947. DWB**—A brief but quantitative account of the method, proposed by the Finnish meteorologist Similä, for determining the most likely temperature and humidity at which ice will form in clouds under conditions such as exist in Moscow. The method was tested from the data from 65 airplane ascents in the Moscow region, and the conclusion reached that the method would be useful for predicting icing in the Moscow region, as verified by 73% of the cases. *Subject Headings:* **Icing of aircraft, Icing forecasting, Aeronautical meteorology, Moscow, U.S.S.R.**—*M.R.*

2.9–129 551.574.7:629.13

Robin, Ben, **Ice isn't nice.** *Air Facts*, 12(1):41–46, Jan. 1, **1949. DLC**—Popular article on nature and effects of icing on aircraft. *Subject Headings:* **Icing of aircraft, Aeronautical meteorology.**

PRECIPITATION

2.9–130 551.577(058)(410)

*Great Britain. Meteorological Office, **British rainfall 1948. The eighty-eighth annual volume of the British Rainfall Organization.** London, H. M. Stationery Office, **1950.** 218 p. 19 maps, 32 tables. At head of title: M. O. 536. **MH-BH**—This volume includes the usual features: report on the year's work, days with rain, droughts and dry spells, rain spells and wet spells, duration of rainfall, heavy falls in short periods (maximum 3.43 in. in 35 minutes in Hampshire), heavy falls in rainfall days, monthly, seasonal and annual rainfall, evaporation and percolation, and the "general table" for all stations, including long-period averages. A special article by L. C. W. Bonacina deals with snowfall in the British Isles 1936–1945. *Subject Headings:* **Precipitation data, Yearbooks, Great Britain, Northern Ireland.**—*C.E.P.B.*

2.9–131 551.577:627.8(54)

Satakopan, V., **Rainfall analysis for multipurpose water power projects in India.** *Indian Journal of Meteorology and Geophysics*, 2(1):9–24, Jan. **1951.** 2 figs., 4 tables, 36 refs., 3 equations. **MH-BH**—A discussion of the kind of analysis of rainfall data that should be undertaken for providing adequate rainfall information for water power projects in India. The following topics are considered: the scope of rainfall data acquired, the rainfall data collected in India, the use and construction of isohyetal maps, rainfall frequencies, maps of rainfall probabilities, storm rainfall analysis and intensity of rainfall of short duration. A table giving frequencies of rain gauge stations, classified according to the length of period for which rainfall data are available, and a map showing number of rain gauge stations are included. *Subject Headings:* **Rainfall data analysis, Hydraulic engineering, India.**—*I.L.D.*

2.9–132 551.577.2(44)

*Sanson, J., **Bilan pluviométrique des cinq années agricoles 1945–46 à 1949–50.** [Rainfall balance for the five crop years 1945–46 to 1949–50.] *La Météorologie*, 4th Ser., No. 20:240–244, Oct.–Dec. **1950.** tables. French, English and Spanish summaries p. 240. **MH-BH**—Seasonal rainfall data for 10 stations in France and percentage of normal for the years 1945–1950 are given in tabular form. The deficit for the period is remarkable. The drought of 1947 and 1949 shows up also in number of days with rain, thunderstorms and hail. Although 1950 was cool and moist, it was not wet enough to restore the depleted reserves of soil moisture and reservoir levels. Between 1945 and 1950 were four out of the seven warmest and dryest years on record (1875–1950). *Subject Headings:* **Drought, France.**—*M.R.*

2.9–133 551.577.3(54)

*Krishnaswamy, K. R., **Some characteristics of rainfall at Poona.** *Indian Journal of Meteorology and Geophysics*, 2(1):51–56, Jan. **1951.** 7 tables, ref. **MH-BH**—An analysis of the rainfall recorded in 15 minute intervals at Poona by means of a Casella siphon rain gage during the period 1932–1943. The following data have been tabulated: total and average number of rainy days and of spells of rain, total number of rainy days with different numbers of spells of rain, number of spells of rainfall of various durations, intervals between consecutive spells of rain, number of 15 minute intervals in which different intensities of rain were recorded, maximum intensities of rainfall on rainy days and hours of occurrence of maximum intensity of rainfall on rainy days. *Subject Headings:* **Precipitation variations, Rainfall intensity, Poona, India.**—*I.L.D.*

2.9–134 551.577.3(82)

Marchetti, Adolfo A., **Oscilaciones extremas de la cantidad de precipitación en la República Argentina.** [Extreme oscillations of the amount of precipitation in the Argentine Republic.] *Meteoros*, Buenos Aires, 1(1):46–54, Jan. **1951.** 3 tables, 2 refs. **DWB**—The relationship $Q = M/m$, first used by Angot, in which M and m are the maximum and minimum precipitation amounts, respectively, is considered by the author to be the most satisfactory index of the annual variability of precipitation. Q is computed for 58 stations from a 46-year period of record and the values used to present a map of Argentina with Q isolines. The highest station value is 24.4 at San Juan. In general, the highest values, ranging from 4 to

24.4, are found in western and southern Argentina, where mountain and other influences contribute to the high variability indexes. *Subject Headings:* **Precipitation variations, Argentina.**—*R.S.Q.*

2.9–135 551.577.3:551.513(969)

*Yeh, Tu-cheng, Carson, J. E., Marciano, J. J. and Wallen, C. C., **A study of Oahu rainfall and its relation to the general circulation of the atmosphere.** Chicago, University, Dept. of Meteorology, June 1948. 82 leaves. 23 figs., 13 tables, 22 refs. Mimeographed. **DWB**—An elaborate study of the relation between flow patterns and rainfall over the Hawaiian Islands, for the benefit of the Pineapple Research Institute, based on a detailed analysis of Oahu rainfall records. Daily weather maps were typed or classified and the frequency of flow patterns determined. These were correlated with daily rainfall amount, probability, intensity and with anticyclonic or cyclonic rainfall. Cases of storms and of drought were also analyzed. Relation to wind direction and orography also studied. Pt. II consists of a study of relation to maximum westerlies (jet stream) at 700 mb. and Pt. III of relation between trade inversion and rainfall over Oahu, based on convection instability concept. *Subject Headings:* **Precipitation controls, General circulation, Oahu, Hawaiian Islands.**—*M.R.*

2.9–136 551.577.33(65,661.1)

Isnard, H., **La répartition saisonnière des pluies en Algérie.** [The seasonal distribution of rain in Algeria.] *Annales de Géographie*, 59(317):354–361, Nov.–Dec. **1950.** 3 figs., table, 5 refs. **DLC**—The several types of rainfall regime in Algeria are shown graphically and a chart presented to show the percentage of annual rainfall which falls in summer in Algeria and the northwest Sahara. This percentage $\left(\frac{\text{March–Aug.}}{\text{Jan.–Dec.}}\right)$ varies from 25% to 50%. The principal maximum occurs in Dec. in the (1) *coastal* and (2) *sub-litoral* zones; and in Jan. in the (3) *central* and in May (4) *interior* zones. Secondary maxima occur in May, in the first three, and in Nov. and Jan. in the fourth zone. *Subject Headings:* **Precipitation variations, Precipitation distribution, Algeria, Sahara Desert.**—*M.R.*

2.9–137 551.577.36(481)

*Evjen, Sigurd, **Nedbørhyppigheten i Oslo og dens avhengighet av den midlere vind over Sør-Skandinavia.** [Frequency of precipitation in Oslo and its dependence on the mean wind over southern Scandinavia.] *Naturen*, Bergen, 75(3):80–87, **1951.** 4 figs., 3 tables. **DWB**—Mean velocity and direction of the geostrophic wind over southern Scandinavia (long. 5°–25°E; lat. 55°–65°N) and precipitation frequency over Oslo were determined for the period 1922–1931 for each season. An analysis of the relationship between precipitation and wind direction and wind velocity indicates; that during all seasons southerly winds are associated with the highest precipitation frequency, that during the summer the northerly winds are associated with a higher precipitation frequency during the first 24 hours than during the other seasons, that increasing wind velocity of the southerly winds is followed by rising precipitation frequency during the first twenty-four hours and that drought periods are more often associated with northerly than with southerly winds. *Subject Headings:* **Precipitation frequencies, Oslo, Norway.**—*I.L.D.*

2.9–138 551.577.37:551.515.23(52)

Kasamura, S., **A relation between the path of typhoon or line of discontinuity and the rainfall distribution in the basin of the river "Onga."** *Journal of Meteorological Research*, Tokyo, 2(10):319–322, Nov. **1950.** 8 figs., table. In Japanese, English summary p. (9). **MH-BH**—Distributions of heavy rains are classified into 7 types according to track of associated typhoon or line of discontinuity. The results are useful for flood forecasting. *Subject Headings:* **Typhoon tracks, Precipitation distribution, Onga River Basin, Japan.**—*C.E.P.B.*

2.9–139 551.577.51(922)

*de Boer, H. J., **On the relation between rainfall and altitude in Java, Indonesia.** *Chronica Naturae*, No. 106:8–9, Aug.–Sept. **1950.** 4 tables, 3 refs. Reprint available. **DWB**—Rainfall data for a large number of stations in Java was analyzed according to elevation above sea

level of the station and region. Java was divided into 3 districts (west, central and east) and the stations in each district listed according to expanding class intervals of 100 to 500 m. from sea level to 3500 m. It was found that a maximum occurred at 1200 m. in West Java (over twice amount at sea level), at 1200 and 800 m. (double maximum) in Central and East Java, but during east monsoon period maximum is at 700 or 500 m. over all of Java. During west monsoon maximum is higher. *Subject Headings:* **Precipitation variations, Topographic effects, Java, Indonesia.**—*M.R.*

2.9–140 551.578(44)

*Péguy, Ch. P., **Caractéristiques hydrologiques de l'année 1949; précipitations et écoulement.** [Hydrologic characteristics of the year 1949; precipitation and runoff.] *Société Hydrotechnique de France, Annuaire Hydrologique,* **1949.** p. 49–64. figs., tables. **DWB**—This annual report is notable because of the unusual lack of moisture during 1949. Data on precipitation, runoff and temperature are given and a chart shows rainfall stations in the mountain areas of France. Histograms of monthly precipitation for 1949 and for 1920–1949 are given for several key stations. *Subject Headings:* **Precipitation, Drought, France.**—*M.R.*

2.9–141 551.578.4(41)

Hawke, E. L. and Champion, D. L., **Report on the snow survey of Great Britain for the season 1949–50.** *Journal of Glaciology,* 1(9):516–526, March **1951.** 5 figs. **DWB**—A detailed summary of the weather and snowfall month by month Sept.–May, notes on the duration of snow cover on Scottish mountains with graphical summaries by height stages, and snowfall on British coastal waters. *Subject Headings:* **Snow surveys, Snow cover, Great Britain.**—*C.E.P.B.*

2.9–142 551.578.45:551.506.2(448 1/7)

§Arléry, R., **Chutes de neige remarquables des 24 et 25 janvier 1950 dans les Cévennes méridionales et le Languedoc méditerranéen.** [Remarkable snowfall on January 24 and 25, 1950 in the southern Cévennes and the Mediterranean Languedoc.] *La Météorologie,* 4th Ser., No. 20:205–213, Oct.–Dec. **1950.** 6 figs., fold. map, 2 refs. French, English and Spanish summaries p. 205. **MH-BH**—Details of the storm and the damage caused by a snowfall, which was .5 to 1.0 m. in depth in many places, as reported from numerous stations on the Mediterranean coast. A large chart shows depth at each place and isopleths of total fall. The isobaric situation is described and illustrated by means of 5 thrice daily synoptic charts. The air mass distribution was similar to that which produced the floods of Oct. 15, 1940 and other flood conditions described by Viaut and Sanson. *Subject Headings:* **Snowstorms, France.**—*M.R.*

HYDROMETEOROLOGY

2.9–143 551.579:551.573(43)

*Friedrich, Wilhelm, **Über die Verdunstung vom Erdboden.** [On evaporation from the earth's surface.] *Das Gas- und Wasserfach,* 91(24) **1950.** 8 p. 10 tables, 15 refs. Reprint available. **DWB**—Monthly, semi-annual and annual data on temperature, rainfall, evaporation (from grass covered, shrub covered, sandy soil and from bare ground without ground water and from vegetative soil with ground water 40–50 cm. deep) and soil moisture for the years 1930–1939, are given in tables and discussed in connection with lysimeter measurements made at Eberswalde. *Subject Headings:* **Hydrologic cycle, Evaporation, Soil moisture, Eberswalde, Germany.**—*M.R.*

2.9–144 551.579

Water vapor transport project, Quarterly Report No. 1, October 15, 1950 to December 15, 1950. Johns Hopkins University, Dept. of Civil Engineering, Dec. 15, **1950.** 27 p. 3 figs., table, 17 equations. **DWB**—A report on the organization of a comprehensive project for determining the amount of water vapor transported from the oceans or Gulf of Mexico to the North American continent, and vice-versa. The basic moisture data is obtained from a well-spaced network of the radiosonde stations in North America and the other necessary information from U. S. Weather Bureau synoptic charts. All basic information is placed on punched

cards at New Orleans, and additional information at the project at Johns Hopkins. Energy and water vapor balance equations are given, and the punched card and network of stations illustrated. *Subject Headings:* **Water vapor transport, Punched card methods, Hydrologic cycle, North America.**—*M.R.*

2.9–145 551.579:551.509

Work, Robert A. and Houston, Clyde E., **Runoff forecasts—1951 water supply in Western States.** *Western Construction*, 26(5):76–78, 144, May **1951.** 4 figs. **DWB**—Runoff forecasts for 1951 are given for Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, Wyoming and British Columbia. Generally the runoff follows 1950 patterns. There is a possibility of flood in the Northwestern States, of critical drought in the Southeast and abundant water supply in the Mountain States. *Subject Headings:* **Runoff forecasting, Western United States.**—*I.L.D.*

2.9–146 551.579.4(47)

*Davidov, L. K., **Povtoriaemost' intensivnosti vesennikh polovodiĭ na rekakh SSSR.** [Frequency of the intensity of the spring floods on the rivers of the U.S.S.R.] *Meteorologiia i Gidrologiia*, No. 3:34–39, **1947.** 8 tables. **DWB**—The paper presents an attempt at classification of the rivers of the U.S.S.R. according to the intensity of their spring floods. The intensities are divided into 5 groups marked 5 (highest) to 1 (lowest), and the rivers are classified according to the percentage frequency of intensity of spring floods. The author then discusses the geographical distribution of every type. *Subject Headings:* **Flood frequencies, Spring floods, Flood distribution, U.S.S.R.**—*C.K.*

2.9–147 551.579.5:63

*Bastisse, E. M., **Observations en cases lysimétriques.** [Observations in lysimetric plots.] Paris, Institut National de la Recherche Agronomique, Travaux effectués en 1949 par les stations agronomiques, **1950.** p. 3–9. tables. **DWB** --Climatic data, obtained at Versailles for agricultural meteorology purposes, is given in detail and analyzed in relation to crop production. The effect of rainfall, evaporation, etc. on soil chemistry, fertilizers and experimental crops is treated. *Subject Headings:* **Soil moisture measurement, Moisture balance, Agronomy.**—*M.R.*

2.9–148 551.579.5:551.577(45)

*Bati, Michele Briccoli, **L'umidità del suolo e il regime pluviometrico in Perugia.** [Soil moisture and the rainfall in Perugia.] *Rivista di Ecologia*, 1(5–6):238–252, **1950.** 4 figs., append. English summary p. 245. **DWB**—The author discusses the relationship between rainfall and soil moisture at four different depths (0–10 cm.; 20–30 cm.; 45–55 cm. and 90–100 cm.) at Perugia during spring, summer, autumn and winter. Data on daily rainfall and soil humidity measurement for one year are given. *Subject Headings:* **Soil moisture, Precipitation, Perugia, Italy.**—*I.L.D.*

2.9–149 551.579.5

Friedrich, Wilhelm, **Die Bedeutung von Lysimeterversuchen für die Grundwasserkunde.** [The importance of lysimeter studies for ground water surveys.] Advance copy of paper presented at meeting of the Deutscher Verein von Gas- und Wasserfach-Männern and Arbeitsgemeinschaft der Verbände der Gas- und Wasserwerke, April 24–26, 1950, at Bad Kissingen. [n.d.] [4 p.] figs., photos. **DWB**—The installations and instrumental equipment at Eberswalde and Giessen (Germany), Coshocton (U.S.A.) and Castricum (Holland) are shown by photos and diagrams, and the usefulness of lysimeter measurements in ground water studies emphasized in the discussion. Lysimeters have been used for 250 years. *Subject Headings:* **Lysimetry, Soil moisture, Eberswalde, Germany.**—*M.R.*

2.9–150 551.579.5(94)

Prescott, J. A. and Thomas, Joyce C., **The length of the growing season in Australia as determined by the effectiveness of the rainfall.** *Royal Geographical Society of Australasia, Proceedings*, 50:42–46, **1948–49.** map, 2 tables. Reprint available. **DWB**—Map of Aus-

tralia and table shows average length of period (months) with values of moisture index $P/s.d.^{.75}$ equal to or in excess of certain values (4, 8, 12, 16 and 20). Variability in effective rainfall is not considered in this paper. Brief discussion. *Subject Headings:* **Precipitation effectiveness, Soil moisture, Australia.**—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

2.9–151 551.582(44)

De Farcy, Henri, **Paysans du Lyonnais. La vie agricole dans la Valleé de l'Yzeron.** [Farmers of Lyonnais. Agricultural life in the Yzeron Valley.] *Lyons, Université, Institut des Études Rhodaniennes, Mémoires et Documents*, 5, **1950.** 169 p. 38 figs., 8 plates, 11 tables, biblio. p. 153–161. **DWB**—This monograph is on agricultural geography of Lyonnais. It contains a brief chapter on the climate of the region (p. 19–29). The climate of each season is described in detail and a table gives the annual march of rainfall, temperature and wind velocity and number of days of frost, of temperatures above 35°C., of hail, etc. *Subject Headings:* **Climatology, Agricultural meteorology, Lyonnais, France.**—*I.L.D.*

2.9–152 551.582(44)

*Weimer-Chofardet, Madeleine, **Étude du climat bisontin.** [Study of the climate of Besançon.] *Besançon, Université, Observatoire, Annales, Astronomie et Géophysiques, New Ser.*, 4(2):137–168, **1949.** 3 diagrs., 21 tables. **DWB**—A very nice study of the climatology of a small city which has 60 years (1884–1944) of temperature, precipitation, snow, humidity, cloud amount, sunshine duration, actinometer (1932–1944), pressure, wind, hydrometeor and other data, which have been analyzed in many ways and discussed in regard to the normal and extreme occurrences of each element. *Subject Headings:* **Climatology, Besançon, France.**—*M.R.*

2.9–153 551.582.1/2(46)

*Fontserè y Riba, Eduard, **Una visió meteorològica del Turó de l'Home.** [Meteorological survey of Turó de l'Home.] Barcelona, Edició d'Homenatge, [1950]. 70 p. 23 figs., 9 plates, 24 tables, refs. In Catalonian. **DWB**—This monograph contains a brief sketch of the history of the observatory and an analysis of the meteorological variables at the observatory. Numerical data are given on atmospheric temperature, atmospheric pressure, wind direction and velocity, insolation, cloudiness, fogs, visibility, rainfall, electrical conductivity of the atmosphere and condensation nuclei. Numerous graphs, diagrams and photographs are given. *Subject Headings:* **Climatic data, Turó de l'Home Observatory, Barcelona.**—*I.L.D.*

2.9–154 551.582:551.579(47)

Leimbach, Werner, **Die Sowjetunion; Natur, Volk und Wirtschaft.** [Soviet Union; nature, people and economy.] Stuttgart, Franck'sche Verlagshandlung, **1950.** 526 p. 65 figs., 92 charts. **DLC**—Sec. A. Physical Geography. Chap. IV. Climatic elements (p. 55–86). Chap. V. Hydrology (p. 87–136). Section on climatic elements takes up pressure, wind, temperature, visibility, cloudiness, sunshine, precipitation (amount, frequency, heavy rains, snow) and duration of frozen ground. A fairly analytical treatment with tables and charts. Chapter on hydrology has a great deal on ice conditions in the various seas in and bordering on the Soviet Union. *Subject Headings:* **Climatology, Hydrology, U.S.S.R.**—*M.R.*

2.9–155 551.582(57)

*Koloskov, Pavel Ivanovich, **Klimaticheskoe opisanie iuzhnogo Sakhalina.** [Climatic sketch of southern Sakhalin.] Leningrad, Gidrometizdat., **1936.** 23 p. 6 figs., 31+tables. **DLC.** Photostat available. **DWB**—An excellent analytical study of the various climatic elements (wind, storms, temperature, frost, effective temperature, absolute and relative humidity, rainfall, rainy days, excessive rains, evaporation from water surfaces, cloudiness, fog, thunderstorm, snow cover, soil temperature) and of conditions in the various months or seasons, based on fairly complete data for six stations, all on the coasts of southern Sakhalin. *Subject Headings:* **Climatology, Sakhalin, U.S.S.R.**—*M.R.*

2.9–156 551.582(677):629.1

Cerasuolo, Fernando, **Cenni climatologici sulla Somalia con particolare riferimento al condizioni di volo.** [Climatological sketch of Somaliland with particular reference to flyir conditions.] *Rivista di Meteorologia Aeronautica*, 10(3):26–28, July–Sept. **1950.** Italia French, English and German summaries p. 26. **MH-BH**—Temperature, rainfall, cloudine and atmospheric circulation conditions over Somaliland are briefly summarized for the tw seasons. The "zone of convergence" is described and dangers from cumulonimbus, turbulenc and icing (above 4000 m.) are the chief hazards. *Subject Headings:* **Climatatology, Somalilanc** —*M.R.*

2.9–157 551.582(81

*Maack, Reinhard, **Notas preliminares sôbre clima, solos e vegetação do Estado do Paraná** [Preliminary notes on climate, soils and vegetation of the State of Paraná.] *Boletin Ge gráfico*, 7(84):1401–1487, March **1950.** 22 figs., fold. chart, tables, 55 refs. **DLC**—Climati controls are first discussed followed by a discussion of climatic factors affecting vegetation Tables, charts and graphs, showing local and seasonal variation in rainfall, temperature precipitation effectiveness, variability, etc. are included. *Subject Headings:* **Climatology Paraná, Brazil.**—*M.R.*

2.9–158 551.582(969

Leopold, Luna B. and Stidd, C. K., **A review of concepts in Hawaiian climatology.** *Pa cific Science*, 3(3):215–225, July **1949.** 41 refs. **DLC**—Discusses relations of rainfall to synoptic types, upper air conditions (temperature at 300 mb. important) and convective clouds; geographical distribution and annual variation of rainfall in relation to topography use of median instead of mean for monthly rainfall; winds; general and diurnal variation climate and crops. Includes many summaries of published and MS work. *Subject Headings* **Climatology, Hawaiian Islands.**—*C.E.P.B.*

BIOCLIMATOLOGY

2.9–159 551.586:612

Mitchell, H. H., **Physical environment control essential in nutrition studies.** *Heating Piping and Air Conditioning*, 22(10):87–90, Oct. **1950. DLC**—Discussion of merits of lab oratory (controlled) investigation of effect of climate or weather on living organisms, over the statistical or observational method usually employed. Nutritional studies for animals under varying climatic stresses have been made at Urbana, Ill. since 1931. Effect of altitude on man discussed. *Subject Headings:* **Physiological climatology, Environment control.**—*M.R.*

2.9–160 551.586:612

Nikogosian, KH. A., **Novyĭ metod gigienicheskogo izucheniia klimata.** [A new method of investigating the medical effects of climate.] *Gigiena i Sanitariia*, No. 2:16–20, Feb. **1951 DLC**—The human organism adapts itself to periodic climatic changes by establishing corresponding physiological rhythms. Nonperiodic climatic changes produce physiological strain. The variations of specific combinations of meteorological elements within a brief interval of time (not more than 24 hours) constitute weather types and are the result of changing air masses. The various weather types and the frequency of change determine the condition and reactions of the human organisms. The following climatic features must be studied the types of weather at a given locality; frequency of change of weather type; frequency of occurrence of various weather types; duration in days of weather types; frequency of transition of one type into another; the quantitative qualitative characteristics of the meteorological elements constituting each weather type. This method was applied to a study of the climate of Kishinev. It was found that seasons or months which were considered favorable by the accepted climatic classification may be unfavorable and productive of physiological strain according to the new system proposed. *Subject Heading:* **Physiological climatology.**—*I. L. D.*

2.9–161 551.586:616

Caroli, Günther, **Atmosphärische und solare Einflüsse auf die Fibrinolyse.** [Atmospheric and solar influences on fibrinolysis.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*

No. 4:12–26, **1950.** 23 figs., 4 tables. **MH-BH**—Frequencies of fibrinolysis at Freiburg were correlated with various meteorological elements. The only significant coefficient is with rainfall character on the Feldberg (+.34). The *n*-method showed maxima on day of passage of cold fronts and minima with warm fronts. Much higher coefficients were found, − with dynamic lability, + with static lability, and with air mass. Relations also investigated with terrestrial magnetism, sunspots and solar eruptions. *Subject Headings:* **Meteorological elements, Physiology, Germany.**—*C.E.P.B.*

2.9–162 551.586:616

Momiyama, M., **Studies on the time series analysis of the seasonal disease.** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):148–152, Oct. **1950.** 2 figs., equations. In English. **MH-BH**—Occurrences of beri-beri in Japanese cities were analyzed by autocorrelation, giving a main periodicity of 12 months (summer maximum) and a secondary one of 6 months (winter maximum). This is expressed as the combination of two annual periods, the harmonic constants of which are calculated for Osaka and Fukuoka. *Subject Headings:* **Medical meteorology, Beri-beri, Japan.**—*C.E.P.B.*

2.9–163 551.586:628.8

Weiller, A. R., **Sur le problème général de la climatisation.** [On the general problem of air conditioning.] *La Météorologie*, 4th Ser., No. 20:245–249, Oct.–Dec. **1950.** tables. French, English and Spanish summaries p. 245. **MH-BH**—Brief tables show the effects of outdoor temperature and humidity on indoor humidity. Wind effect is important in comfort, but is neglected here so as not to complicate the problem. Comfort limits are shown on a diagram and remarks made as to its use. *Subject Headings:* **Comfort zones, Air conditioning.**—*M.R.*

2.9–164 551.586:63

Baltadori, Androkli, **I limiti di espansione del frumento in rapporto alla temperatura e al fotoperiodo.** [Expansion limits for wheat in relation to temperature and photoperiodism.] *Rivista di Ecologia*, 1(5–6):290–299, **1950.** 3 tables, 6 refs. English and Albanian summaries p. 298–299. **DWB**—The roles of photoperiodism and heat in the limits of expansion of wheat cultivation northward and upward are discussed. The poleward extension to 62°N. is attributed to the stimulating influence of light, without which the northern limit would have been 52°N. At the equator the limit of thermal excess is at 900 m. and of thermal deficiency is at 3900 m. *Subject Headings:* **Agricultural climatology, Photoperiodism, Grain crops.**—*I.L.D.*

2.9–165 551.586:92

Berg, H., **Dr. William F. Petersen.**† *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 4:54, **1950. MH-BH**—Obituary of the best known American bioclimatologist, who died in Chicago on Aug. 20, 1950. Author of "The patient and the weather" (1934), "Man—weather—sun" (1947), etc. *Subject Headings:* **Bioclimatology, William F. Petersen, Biography.**—*C.E.P.B.*

MISCELLANEOUS APPLICATIONS

VISIBILITY

2.9–166 551.591

Pearson, C. A., Koomen, M. J. and Tousey, R., **Visual measurements of atmospheric transmission of light at night.** *U. S. Naval Research Laboratory Report* No. 3810, Feb. 23, **1951.** 13 p. 8 figs., 3 tables, 8 refs. **DWB**—The transparency of the atmosphere at night in the visible range of the spectrum, was measured on 120 nights over a 9 mile course across Chesapeake Bay by using a series of calibrated light sources ½ to 1 mile apart. Effects of elevation also investigated. Night observations agreed fairly well with those before sunset and after dawn. Equipment described and illustrated, precision of measurements ±2% for normal values. No apparent correlation between transmission values and relative humidity, pressure, temperature, wind speed or direction. *Subject Headings:* **Visibility, Measurement, Atmospheric transparency.**—*M.R.*

2.9–167 551.591.1

Tassëel, R., **Sur la visibilité des sources lumineuses de balisage.** [On the visibility of boundary lights.] *Journal Scientifique de la Météorologie*, 3(9):16–25, Jan.–March **1951.** 3 figs., table, 19 equations. French, English and Spanish summaries p. 16. **MH-BH**—The physics of visibility is discussed and application to point sources of light developed theoretically. The relation between visibility of boundary lights or beacons and actual meteorological visibility is worked out by means of a formula after KOSCHMIEDER and results shown graphically. *Subject Headings:* **Visibility, Aeronautical meteorology.**—*M.R.*

2.9–168 551.591.2(265)

Arakawa, H., **On the visibility in the NW-PACIFIC.** *Papers in Meteorology and Geophysics*, Tokyo, 1(1):58–66, Oct. **1950.** 8 figs. In English. **MH-BH**—The charts show for area N. of 15°S. and W. of 175°E., for each season, percentage frequencies of excellent visibility (horizon clear) and poor (horizon quite invisible), based on Japanese Navy data. Cause of frequent summer fog in the north briefly discussed. *Subject Headings:* **Visibility, Fog, Northwest Pacific.**—*C.E.P.B.*

OPTICAL PHENOMENA

2.9–169 551.593.11

Mitchell, G. E., **Mirage, Gulf of Cadiz.** *Marine Observer*, 21(152):81, April **1951.** figs. **DWB**—Striking sketches of development of inverted image of ship and false horizon on May 21, 1950. *Subject Headings:* **Mirage, Gulf of Cadiz, Spain.**—*C.E.P.B.*

2.9–170 551.593.13

Ewan, D., **Abnormal refraction off coast of Portugal.** *Marine Observer*, 21(152):80, April **1951.** figs. **DWB**—Abnormal distortion of rising sun. *Subject Headings:* **Refraction of light, Portuguese Coast.**—*C.E.P.B.*

2.9–171 551.593.5

Schüepp, Walter, **Beitrag zum Phänomen der blauen Sonne.** [Contribution on the phenomenon of the blue sun.] *Experientia*, 6(12):457–459, Dec. 15, **1950.** 3 tables, 10 refs. English summary p. 459. **DA.** Reprint available. **DWB**—Reports obtained from Scandinavia, France, Germany, Switzerland and Jungfraujoch. (Not observed at Davos because cloudy all day Sept. 27, 1950.) Turbidity and radiation measurements given for several times in the morning and afternoon. Explanation on basis of size of particles. *Subject Headings:* **Blue sun, Smoke pall—Sept. 1950.**—*M.R.*

2.9–172 551.593.51

Wade, S. B., **Green flash.** *Marine Observer*, 21(152):84, April **1951.** figs. **DWB**—Sketches of distorted setting sun with detached upper part ending in green flash. *Subject Headings:* **Green flash, Red Sea.**—*C.E.P.B.*

2.9–173 551.593(03)(899)

Lagarmilla, Roberto E., **Sobre la coloración anormal del cielo y de los astros, observada periódicamente en Montevideo.** [On the abnormal color of the sky and stars, observed regularly at Montevideo.] *Revista Meteorológica*, Montevideo, 9(35):130–150, Oct. **1950.** 4 figs., 7 refs. **DWB**—Many optical terms used in meteorology are defined. Differences between meteorological and optical characteristics of polar and tropical air masses are listed in tabular form. The most important optical peculiarities of these masses are then discussed: refraction, absorption, diffusion, abnormal reflection, polarization. Causes of these differences are attributed to solid (dust, salt, pollen, smoke, etc.) and liquid particles, and to density differences. Observational methods and actual observations made at Montevideo in 1948, 1949 and 1950 are discussed at length. *Subject Headings:* **Color of sky, Optical phenomena, Glossaries, Montevideo, Uruguay.**—*M.R.*

2.9–174 551.593.9

Watts, C. and Roberts, I. C., **The will-o'-the-wisp.** *Weather*, 6(3):96, March **1951.** **DWB**—Letters (1) suggesting as cause methane ignited by sulphuretted hydrogen; (2) describing an occurrence. *Subject Headings:* **Optical phenomena, Will-o'-the-wisp.**

AURORAS

2.9–175 551.594.5

†Housman, W. B., **Report of sections; aurora and zodiacal light. (Interim report.)** *British Astronomical Association, Journal*, 61(4):100–103, March **1951.** tables. **DLC**—Report covers details of observations in 39 auroral nights between July and Dec. 1950, including position and name of observer, form of aurora, etc. Cases of luminous sky, noctilucent clouds (June 30); zodiacal light also reported. Table shows monthly frequency of aurora in British Isles during 1948, 1949 and 1950. Half (60) of total (128) were in October and November. *Subject Headings:* **Auroras, Optical phenomena, British Isles.**—*M.R.*

2.9–176 551.594.5

Kaplan, Joseph, Brook, Marx and Kash, S. W., **Introduction, Part I. Laboratory studies related to the physics of the upper atmosphere, Part II. A study of the decay of nitrogen afterglows, Part III. Measurement of transition probabilities, Part IV.** *California, University, Institute of Geophysics, Final Report*, Feb. **1951.** 46 leaves. figs., photos, tables, refs., equations. (U. S. Office of Naval Research, Contract No. N6onr-27508.) **DWB**—Pt. I is a report on the discharge and afterglow spectra in pure O_2, in O_2 containing small amounts of N_2, O_2-H_2O mixtures, $He-O_2-H_2O$ mixtures and $O_2-H_2O-N_2$ mixtures. Ozone was found to play a very important part in the reactions, producing the emissions associated with afterglow. Pt. II is the report of a study on the time decay of spectra appearing in an almost pure nitrogen afterglow as functions of pressure and discharge current. The investigation was carried out by means of a photomultiplier and monochromator. The decay of the afterglow was produced by a combination of surface and volume effects. Pt. IV deals with studies on the lifetime of metastable states falling in the range 10^{-4} to 10^{-2} seconds, especially the metastable rare gas atoms and molecules. *Subject Headings:* **Auroral spectra, Night spectra.**—*I.L.D.*

2.9–177 551.594.5

Meinel, A. B., **Doppler-shifted auroral hydrogen emission.** *Astrophysical Journal*, 113(1):50–54, Jan. **1951.** 3 figs., 6 refs. **DWB**—Analysis of spectra obtained during an intense auroral display (Aug. 18–19, 1950) at Yerkes Observatory, shows that protons striking the earth's atmosphere at velocities of 3000 km./sec. or greater (capable of penetrating to the auroral level) during aurorae, provide the main energy source for the auroral spectrum. *Subject Heading:* **Auroral spectra.**—*M.R.*

2.9–178 551.594.5

Meinel, A. B., **Evidence for the entry into the upper atmosphere of high-speed protons during auroral activity.** *Science*, 112(2916):590, Nov. 17, **1950.** 2 refs. **MH-BH**—During several nights of intense auroral activity a special spectrograph, designed by the author, was pointed towards the magnetic lines of force. The profile of the H-alpha emission line was found to be asymmetrical with a maximum violet displacement of 60 A, corresponding to a velocity of 2800 km./sec. Viewed perpendicularly to the magnetic lines, the H-alpha line is symmetrical and undisplaced but broadened by about 6 A. The red edge of the asymmetrical H-alpha had a profile broadened about 6 A. The Döppler displacements indicate that protons of solar origin enter the upper atmosphere at velocities of the order of 2500–3000 km./sec. *Subject Headings:* **Solar protons, Stratosphere, Auroras.**—*I.L.D.*

2.9–179 551.594.51 550.385

Chapman, Sydney, **Notes on aurorae and magnetic storms, I. Considerations as to a model experiment.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):189–199, **1951.** 13 refs., equations. **MH-BH**—The CHAPMAN-FERRARO theory that auroras and magnetic storms are produced by projection from the sun towards the earth of a large volume of neutral ionized gas, mainly hydrogen, is discussed and a model experiment to test it is proposed. The basic calculations are set out and some suggestions made, but the actual model has not yet been worked out. *Subject Headings:* **Auroras, Magnetic storms.**—*C.E.P.B.*

ACOUSTICAL PHENOMENA

2.9–180 551.596.1:551.571

Arabadzyl, V. I. **O pogloshchenii akusticheskikh kolebaniĭ vo vlazhnom vozdukhe i tumane.** [Absorption of acoustic waves in humid air and fog.] *Meteorologiia i Gidrologiia*, No. 3:11–18, **1947.** table, 12 equations. **DWB**—The paper contains a survey of the present state of knowledge of the theory of absorption of sound waves in clouds and fog. Size of water drops in the atmosphere, frequency of sound waves being propagated and chemical composition, as well as sound and zones of silence are discussed. *Subject Headings:* **Sound propagation, Humidity effects.**—*C.K.*

2.9–181 551.596.1:623.481.1

Igloo tests, Arco, Idaho 1945. *U. S. Army-Navy Explosives Safety Boards, Technical Paper* No. 3, June 1, **1946.** 166+p. figs., photos, map, tables, 22 append. **DWB**—In connection with tests of damage to structures, resulting from large explosions, meteorological observations were made at or near the proving ground at Arco, Idaho and from cooperative observers all over the Western United States. Local observations consisted of radiosonde, theodolite and microbarograph records. Electromagnetic barograph records were obtained from Dubois, Idaho and West Yellowstone, Montana (50 and 111 miles from Arco, respectively). Seven hundred and six cooperative reports were obtained and are shown on a chart and in a table. Seventy-three reported hearing the explosion. (*See also item* J–92 Oct. 1950 *Meteorological Abstracts.*) *Subject Headings:* **Audibility zones, Anomalous sound propagation.**—*M.R.*

2.9–182 551.596.1

Veldkamp, J., **On the propagation of sound over great distances.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):147–151, **1951.** 4 figs., 2 tables, 9 refs., 2 equations. **MH-BH**—Author calculated tracks, travel time and energy of air waves of order of 0.1 c./s. He found two abnormal waves, one reflected between 40 and 55 km. and the other above 80 km., both partly double. Waves of frequency 0.1 can reach a height of 180 km. and a surface distance of 800 km. Frequencies above 70 c./s. are absorbed in upper stratosphere. *Subject Heading:* **Anomalous sound propagation.**—*C.E.P.B.*

2.9–183 551.596.5:534

Fleagle, Robert G., **The audibility of thunder.** *Acoustical Society of America, Journal*, 21(4):411–412, July **1949.** 5 refs., 13 equations. Reprint available. **DLC**—Thunder is rarely heard at a distance of more than 25 km. Author calculates paths of sound waves tangent to earth for various lapse rates and wind shears. These are approximately parabolas. With a lapse of 7½°C./km. and small shear, thunder at a height of 4 km. would be inaudible beyond 25 km. Shear would probably reduce this. *Subject Headings:* **Acoustical phenomena, Audibility of thunder.**—*C.E.P.B.*

PART II. ANNOTATED BIBLIOGRAPHY ON CONDENSATION TRAILS BEHIND AIRCRAFT

By: *Mollie P. Kramer*

EXPLANATORY NOTE

A fairly exhaustive search has been conducted for material on the subject of condensation trails behind aircraft. Selected articles which contribute significantly to an understanding of the physics of the phenomenon have also been included. Because of the limited scope of the subject matter, no articles found have been omitted.

In the ensuing outline condensation trails have been divided into three groups, exhaust trails, aerodynamic or adiabatic trails, and negative condensation trails. Of these three types the exhaust trails are by far the most important and have received the fullest treatment.

An attempt has been made to include all available references in foreign languages as well as those reports published in English.

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BIBLIOGRAPHY ON CONDENSATION TRAILS

1917

2I–1 551.576.11:551.507.351

Sherry, Bertram J., **Peculiar streak in line with kite wire.** *Monthly Weather Review*, 45:269–270, June 1917. With remarks by William R. Blair. **DWB**—A clear blue streak, apparently a rift in the clouds, was observed directly in line with a kite wire. Possible explanations are: the reflection of light from the kite wire, some electrical effect of the wire that caused the clouds to dissipate or a weakening of the surface tension of the liquid cloud particles resulting in evaporation. Other cases of the same phenomenon are cited. *Subject Headings:* **Condensation trails, Negative condensation trails, Kites, Nebraska.**

1918

2I–2 551.576.11:551.507.351

Observations at Ellendale, North Dakota—January 15, 1918. *Monthly Weather Review, Supplement* No. 12:6, 1918. 2 refs. **DWB**—A kite caused a streak of dissolution in cirrostratus clouds which resembled the rapid ripping of a piece of cloth. *Subject Headings:* **Condensation trails, Negative condensation trails, Kites, North Dakota.**

1919

2I–3 551.576.11:629.13

Baschin, O., **Flugzeuge als Wolkenbildner und Wolkenfresser.** [Airplanes as cloud builders and dissipators.] *Deutsche Luftfahrerzeitschrift*, No. 13–14:6, 1919. 2 refs. With comments by Theo Schreiner. **DLC**—Description of a condensation trail observed behind an airplane is given and explained as resulting from the addition of condensation nuclei. A. Schmauss's account of the dissolution of a layer of haze due to dynamic processes, initiated by the passage of airplanes, is quoted. Theo Schreiner points out the technical impossibility of such condensation trails' being merely oil fumes. He points out the ice crystal structure and the appearance of halo phenomena in the trails. *Subject Headings:* **Condensation trails, Negative condensation trails, Condensation nuclei, Munich, Germany.**

2I–4 551.576.11:551.593

Douglas, C. K. M., **Optical phenomena and the composition of clouds.** *Scottish Meteorological Society, Journal*, 18(36):83–86, 1919. 3 refs. **DLC**—This article on optical phenomena adds further weight to the theory that supercooled water vapor can exist at very high altitudes. *Subject Headings:* **Condensation trails, Supercooled water vapor.**

2I–5 551.576.11:629.13

Ettenreich, Robert, **Wolkenbildung über einer Feuersbrunst und an Flugzeugabgasen.** [Cloud formation over a conflagration and in airplane exhaust.] *Meteorologische Zeitschrift*, 36:355, 1919.

fig. **DLC**—The author compares the cloud formation, inaugurated by the introduction of condensation nuclei by smoke into a supersaturated air layer, with the cloud formation observed in the South Tyrol in the exhaust trail of an airplane. *Subject Headings:* **Condensation trails, Supersaturation, Condensation nuclei, Tyrol, Italy.**

2I–6 551.576.11:551.575.1

Schmauss, August, **Randbemerkungen II. 8. Auflösung eines Wolkenschleiers durch ein Flugzeug.** [Margin notes II. 8. The dissolution of a cloud haze by an airplane.] *Meteorologische Zeitschrift*, 36:13, **1919.** ref. **DLC**—The author describes having seen the track of an airplane appear as a blue streak in a white layer of haze. He attributes the phenomenon to the dynamic mixing of the air by the plane's propellers rather than to the heating effect of the hot exhaust gases. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing.**

2I–7 551.576.11:629.13

Schmauss, August, **Randbemerkungen IV. 10. Bildung einer Cirruswolke durch einen Flieger.** [Margin notes IV. 10. Formation of a cirrus cloud by an airplane.] *Meteorologische Zeitschrift*, 36:265, **1919.** ref. **DLC**—SCHMAUSS comments on the similar weather conditions which prevailed at Munich on days when negative condensation trails were formed and on days when artificial cirrus formation occurred. He believes a varying degree of the velocity of diffusion of condensation nuclei may account for the different phenomena observed. *Subject Headings:* **Condensation trails, Negative condensation trails, Condensation nuclei, Munich, Germany.**

2I–8 551.576.11:629.13

Weickmann, Ludwig, **Wolkenbildung durch ein Flugzeug.** [Cloud formation resulting from an airplane.] *Naturwissenschaften*, 7(33):625, **1919.** fig. **DLC**—An early example of a condensation trail observed in Munich, Germany, is reported with great enthusiasm. The phenomenon is explained as resulting from the introduction of "finely divided carbon" into supersaturated air at a high level. *Subject Headings:* **Condensation trails, Condensation nuclei, Munich, Germany.**

2I–9 551.576.11

Well, Everett D., **Remarks on condensation trails.** *Scientific American*, 120:601, June **1919. DWB**—An early, unscientific description of condensation trail phenomena observed over the Argonne battle area. *Subject Headings:* **Condensation trails, France.**

1920

2I–10 551.576.11:629.13

Nead, Walter H., **The Argonne battle cloud.** *American Legion Weekly*, 2(30):12, Oct. 22, **1920. DLC**—Long cirrus clouds formed in the wake of three planes due to the cooling effect of their propellers. Their ice crystal structure was proved when halo phenomena were observed. *Subject Headings:* **Condensation trails, Propeller trails, Halos, France.**

2I–11 551.576.11:629.13

Schmauss, August, **Randbemerkungen V. I. Wolkenbildung durch einen Flieger.** [Margin notes V. I. Cloud formation by an airplane.] *Meteorologische Zeitschrift*, 37:152, **1920.** ref. **DLC**—On a clear, moderately warm day with small cumulus clouds in the northeast, cumulus clouds of the same appearance and shape formed behind an airplane. Brief reference is made to cloud formation caused by the explosion of shrapnel. *Subject Headings:* **Condensation trails, Cumulus clouds, Germany.**

2I–12 551.576.11:629.13

Vaughn, George B., **Who can tell him?** *American Legion Weekly*, 2(35):28, Sept. 24, **1920. DLC**—A descriptive but unscientific eyewitness account is given of condensation trails over the Argonne battle front. *Subject Headings:* **Condensation trails, France.**

2I–13 551.576.11

Wegener, Alfred, **Frostübersättigung und Cirren.** [Frost supersaturation and cirrus.] *Meteorologische Zeitschrift*, 37:8–12, **1920.** fig., refs. Abstract in *Monthly Weather Review*, 49:349, June 1921. 2 refs. **DLC**—Over a small range of vapor pressure, condensation may be occurring on ice while water at the same temperature is evaporating. WEGENER attributes cloud formation in such supersaturated conditions to the introduction of condensation nuclei in smoke, airplane exhaust, or other forms. *Subject Headings:* **Condensation trails, Condensation nuclei, Supersaturation.**

1921

2I–14 551.576.11:629.13

Cloud formation by supercharged planes. *Monthly Weather Review*, 49:412, **1921.** 2 refs. **DLC**—A distinct white streamer of cirrus cloud formed at 26,000 ft. altitude behind an airplane. It appeared to be 10 to 15 times the width of the plane. A trail of blue became visible when the plane entered a region of cirrus clouds. *Subject Headings:* **Condensation trails, Negative condensation trails, Ohio.**

2I–15 551.576.11:629.13

Cloud formation in the wake of an airplane. *Tycos-Rochester*, 11:20, April **1921.** 3 refs. **DWB**—Reference is made to the condensation trail observed over Munich in 1919. *Subject Headings:* **Condensation trails, Munich, Germany.**

2I–16 551.576.11:629.13

Varney, B. M., **The Argonne battle cloud.** *Monthly Weather Review*, 49:348–349, June **1921.** 4 refs. **DWB**—Varney disputes WALTER H. NEAD's explanation of the cloud formations resulting from a reduction in temperature due to stirring of the air by airplane propellers. He contends that an increase in the moisture content of the air, resulting from addition of water vapor from exhaust gas, accounts for the phenomenon. He suggests also that, were supersaturation to occur in the atmosphere, the atmospheric vibration set up by the exhaust might prove sufficient to cause condensation. *Subject Headings:* **Condensation trails, Supersaturation, France.**

1923

2I–17 551.576.11:551.507.351

Riley, I. A., **Cloud dissipated by kite.** *Monthly Weather Review*, 51:400, **1923.** 4 refs. **DLC**—A kite caused a rift in a cloud which appeared as a straight dark line for several minutes after the passage of the kite. The phenomenon was ascribed to the evaporation of the cloud particles due to the deflective action of the kite on warmer air in an inversion above the cloud. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing, Kites.**

1925

2I–18 551.576.11

Jaumotte, J., **Un cas de sursaturation extraordinaire dans l'atmosphère libre.** [A case of extraordinary supersaturation in the free atmosphere.] *Ciel et Terre*, 41(3):42–49, March **1925.** 3 figs., table, 2 refs. Abstracted in *Monthly Weather Review*, 53:79, 1925. **DLC**—Extreme supersaturation can occur when air is completely deprived of the usual condensation nuclei. Such supersaturation is exceptional at 5–6 km. but is frequent at the mean cirrus level. *Subject Headings:* **Condensation trails, Supersaturation, Condensation nuclei, Icing of aircraft.**

1926

2I–19 629.13

Glauert, Hermann, **Airfoil and airscrew theory.** Cambridge, England, University Press, **1926.** 228 p. 116 figs., equations. **DLC**—A comprehensive study of airfoil and airscrew theory basic to an understanding of aerodynamic wing-tip and propeller trails. *Subject Headings:* **Condensation trails, Turbulence theory.**

2I–20 551.576.11:629.13

Smoke trail behind aeroplane. *Meteorological Magazine*, London, 61:116, **1926–1927. DLC**—"A straight trail of steam or smoke," due to the condensation of the water of combustion owing to the low temperature (−44°C.), was observed behind a plane flying at 25,000 ft. *Subject Headings:* **Condensation trails, Saturation, England.**

1927

2I–21 551.576.11

Wendler, August, **Das Problem der technischen Wetterbeeinflussung.** [The problem of technical weather control.] *Probleme der kosmischen Physik*, No. 9, **1927.** 107 p. 4 figs., 104 refs. **DLC**—WENDLER, in this monograph, discusses the existing knowledge in the field, the most important physical and chemical bases for the evaluation of the atmospheric processes, the techniques of free-air experimentation and other selected problems. Discussion of condensation nuclei and products is found in Pt. II with a specific reference to WEGENER's theory of frost supersaturation as related to condensation trails. (*Same item* as No. C–108 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **Condensation trails, Supersaturation, Condensation nuclei.**

1928

2I–22 551.576.11:629.13

Lautner, Peter, **Wolkenbildung durch ein Flugzeug.** [Cloud formation resulting from aircraft.] *Meteorologische Zeitschrift*, 45:349, **1928.** 2 photos, 3 refs. **DWB**—The author reports having seen a clear-cut condensation trail marking the wake of a plane which had just emerged from a well developed stratocumulus cloud. The trail, which was approximately 700 m. long, ended abruptly. *Subject Headings:* **Condensation trails, Germany.**

2I–23 551.576.11:629.13

Loewe, F., **Auslösung von Wolkenbildung durch ein Flugzeug.** [Dissolution of clouds by an airplane.] *Lindenberg, Aeronautisches Observatorium, Mitteilungen*, No. 47:161–162, **1928.** 5 refs. **DWB**—The phenomenon of cloud dissolution was observed in only one out of fifty cases of airplanes flying at the cirrus level. The author explains the unusual occurrence by the supposed existence of a particularly high degree of supersaturation. He does not further clarify his theory. *Subject Headings:* **Condensation trails, Negative condensation trails, Supersaturation, Berlin, Germany.**

1929

2I–24 551.576.11:551.574.1

Wigand, Albert and Schmauss, August, **Die Atmosphäre als Kolloid.** [The atmosphere as a colloid.] Braunschweig, **1929.** 74 p. 10 figs., biblio. p. 66 69. **DWB**—A comprehensive study of the colloidal characteristics of the atmosphere containing excellent background material necessary for the understanding of condensation trail phenomena. Turbulence, condensation nuclei and electrical influences are treated under separate headings. (*Same item* as No. C–11 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **Condensation trails, Condensation nuclei, Aerosols.**

1930

2I–25 551.576.11:629.13

Peppler, W., **Wolkenbildung durch Flugzeuge.** [Cloud formation by aircraft.] *Zeitschrift für angewandte Meteorologie*, 47:35–46, **1930.** photo, 3 tables, 18 refs. **DWB**—Peppler summarizes the important writings on condensation trails. He refers briefly to the various explanatory theories such as that of A. Schmauss (exhaust provides condensation nuclei), D. Loewe (frost supersaturation of the upper air) and I. A. Riley (admixture of warmer air). He mentions also the theory that air at a high altitude can be free from the usual condensation nuclei and can occasionally reach a relatively higher degree of supersaturation. In certain cases large ions can serve as nuclei for cloud formation. Peppler concludes that further study and observation of the phenomena combined with a study of the colloidal character of the atmosphere is necessary to determine the cause of cloud formation by aircraft. *Subject Headings:* **Condensation trails, Condensation nuclei, Supersaturation, Adiabatic cooling.**

1931

2I–26 551.576.11:629.13

Bigg, William H., **Alto-cumulus formed by an aeroplane.** *Meteorological Magazine*, London, 66(784):89–90, March **1931. DLC**—Altocumulus formation ceased above 13,000 ft. and below approximately 900 ft. The phenomenon was attributed to the sudden cooling of saturated air due to reduction of pressure, mechanical disturbance and precipitation of a supercooled layer, and the emission of nuclei and water vapor from the exhaust. Synoptic details are included. *Subject Headings:* **Condensation trails, Adiabatic cooling, Condensation nuclei, Altocumulus clouds, England.**

2I–27 551.576.11:551.507.321

Kuhlbrodt, E., **Bildung von Cirrus-Wölkchen beim Platzen von Pilotballonen in grossen Höhen in den Tropen.** [Formation of small Ci-clouds by bursting of pilot balloons at great heights in the tropics.] *Beiträge zur Geophysik*, 34:9–20, **1931.** 2 figs., 2 tables, 10 refs. **DLC**—The phenomenon of cloud formation is explained after the precedent of Alfred Wegener. In the particularly cold temperatures of the upper air layers above the tropics exist conditions conducive to supersaturation. The lacking condensation nuclei are provided by the dust clouds (talc) accompanying the bursting of balloons. *Subject Headings:* **Condensation trails, Condensation nuclei, Supersaturation, Tropics.**

1932

2I–28 551.576.11:629.13

Smith, J. S., **Altocumulus formed by an aeroplane.** *Meteorological Magazine*, London, 67:139, **1932.** 2 refs. **DWB**—Good descriptions are given of three condensation trails, one of which was a double trail behind a single engined plane. The trails are explained as being the visible evidence of condensation originating at or near the propellers where a reduction of pressure is produced on the forward side. All examples described occurred in maritime polar air. *Subject Headings:* **Condensation trails, Adiabatic cooling, Altocumulus clouds, England.**

1933

2I–29 551.576.11:629.13

Bigg, William H., **Cloud formation at the cirrus level by means of an aeroplane.** *Meteorological Magazine*, London, 67:288, **1933.** 2 refs. **DWB**—A thick stream of cirrus cloud formed behind an airplane between altitudes of 25,000 ft. (−47°F.) and 27,000 ft. (−56°F.). *Subject Headings:* **Condensation trails, Artificial cirrus clouds, England.**

1935

2I–30 551.576.11:629.13

Moon, A. E., **Clouds formed by an aeroplane.** *Meteorological Magazine*, London, 70(829):18–19, Feb. **1935. DLC**—A plane travelling at great height left a distinct trail of cirrus cloud. Synoptic details are given. *Subject Headings:* **Condensation trails, Artificial cirrus clouds, England.**

2I–31 551.576.11:629.13

Watson, R. E., Moon, A. E. and Dight, F. H., **Partial cloud dispersal by an aeroplane.** *Meteorological Magazine*, London, 70:140-141, 232–233, **1935. DLC**—Watson gives details of a lane cut through thin ACu (10–12-ft. thick) May 26, 1935; Moon describes a similar case June 26. Dight describes a lane cut in fog. Suggested cause, admixture of drier air. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing, England.**—*C.E.P.B.*

1936

2I–32 551.576.11:629.13

The formation of cloud by aeroplanes, September 3rd, 1935. *Meteorological Magazine*, London, 71:19–20, **1936. DLC**—Descriptions by several observers of persistent cloud streaks formed by two aircraft at about 30,000 ft. over South England on Sept. 3, 1935. *Subject Headings:* **Condensation trails, England.**—*C.E.P.B.*

2I–33 551.576.11:629.13

K———, T., **Obrazovanie oblakov ot aeroplana.** [Cloud formation by airplane.] *Klimat i Pogoda*, Leningrad, 12(1):43, **1936.** ref. **DWB**—Trails of artificial cirrus formed behind airplanes flying at great altitude above Saratov and persisted for thirty minutes. Other examples of similar phenomena are referred to. *Subject Headings:* **Condensation trails, Artificial cirrus clouds, Saratov, U.S.S.R.**

2I–34 551.576.11:629.13

Langmuir, Irving and Forbes, Alexander, **Airplane tracks in the surface of stratus clouds.** *Journal of Aeronautical Sciences*, 3(11):385–387, **1936.** fig. **DLC**—Tracks made by airplanes in the surface of stratus clouds are cited as proof that a sharply defined upper surface of a stratus cloud, correlated with temperature inversion, presents a condition of great stability. The downward component of velocity given to the air by the weight of the plane forced warmer air from the overlying inversion down into the colder air of the clouds and caused the tracks. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing.**

2I–35 551.576.11:629.13

A note on the visibility of vortices. *Journal of Aeronautical Sciences*, 4(2):80, Dec. **1936. DBS**—Tip vortices can be made visible by smoke or by the condensation of moisture in the air. *Subject Headings:* **Condensation trails, Visible vortices, Wing tip trails, Propeller trails.**

1937

2I–36 551.576.11:629.13

Dewar, D., **Altocumulus type cloud formed by an aeroplane.** *Meteorological Magazine*, London, 72:94–95, **1937. DLC**—Three cases on March 10, 1937 at Aldergrove at 8900, 12,800 and 15,000 ft. Synoptic details given. Notable for unusual vertical extent of cloud-forming layer. *Subject Headings:* **Condensation trails, Altocumulus clouds, England.**—*C.E.P.B.*

2I–37 551.576.11:629.13

Dight, F. H., **Altocumulus type cloud formed by an aeroplane.** *Meteorological Magazine*, London, 72:236–237, **1937.** ref. **DLC**—Such cloud is due to condensation caused by the pressure reduction in the slipstream of the aircraft and is normally in evidence at a relatively short distance behind the airscrew. Artificial cloud formation occurs most often in the rear of complex depression systems in layers rarely exceeding 1000 ft. in thickness. *Subject Headings:* **Condensation trails, Adiabatic cooling, Altocumulus clouds.**

2I–38 551.576.11:629.13

Gordon-Marshall, P. E., **Aberdonian sky-writing.** *Flight*, 31(1483):533, May 27, **1937.** photo. Comments by ed. **DLC**—An interesting photographic example of spirals of vapor trailing from airscrew tips accompanies an eyewitness account of the phenomenon. *Subject Headings:* **Condensation trails, Visible vortices, Scotland.**

2I–39 551.576.11:629.13

Hancock, D. C., **Clouds caused by aeroplanes.** *Meteorological Magazine*, London, 72(857):112–113, June **1937.** **DLC**—The observer describes two "line" clouds which were "far too regular to have been formed by other than mechanical means." They appeared snow-white against a background of cirrostratus and cirrocumulus. *Subject Headings:* **Condensation trails, England.**

2I–40 551.576.11:551.575.1:629.13

Katheder, Fr., **Auflösung einer Bodennebeldecke durch ein startendes Flugzeug.** [Dissolution of a layer of ground fog by an airplane taking off.] *Zeitschrift für angewandte Meteorologie*, 54:61–63, **1937.** 2 refs. **DWB**—An airplane taking off from the Nuremberg airport left a distinct trail of dissolution in fog along the runway. Several explanations, including disruption of the cloud's stability by electrical effects, are advanced. The practical importance of such fog dissipation is weighed. *Subject Headings:* **Condensation trails, Negative condensation trails, Fog, Nuremberg, Germany.**

2I–41 551.576.11:629.13

Kirsten, H., **Wolkenbildung durch Flugzeug.** [Cloud formation by aircraft.] *Germany. Reichsamt für Wetterdienst, Erfahrungsberichte, Band Neudrucke*, 3:337–341, **1937.** equations. **DLC**—The importance of the water vapor from airplane exhaust in the formation of condensation trails is stressed. A mathematical explanation is given for the amount of water vapor present in exhaust. *Subject Headings:* **Condensation trails, Exhaust trails, Supersaturation, Condensation nuclei.**

2I–42 551.576.11:551.575.1:629.13

Runge, H., **Entstehung von Bodennebel durch Auspuffgase.** [Formation of ground fog by exhaust gas.] *Zeitschrift für angewandte Meteorologie*, 54:307–308, **1937.** ref. **DWB**—Author refers to KATHEDER's article (*see item* 2I–40 above) on fog dissolution by airplanes and reports two cases of fog formation by airplanes taking off and one case of dissolution by a landing plane in Königsberg. Dynamic mixing caused the dissipation and addition of water vapor, the fog formation. *Subject Headings:* **Condensation trails, Negative Condensation trails, Fog, Königsberg, Germany.**

1938

2I–43 551.576.11:629.13

Andrus, C. G., **Airplane dissipates cloud.** *American Meteorological Society, Bulletin*, 19:45–46, Jan. **1938.** **DLC**—A brief account is given of the dissipation of a portion of an altocumulus cloud layer by an airplane at 10,000 ft. *Subject Headings:* **Condensation trails, Negative condensation trails, Ohio.**

2I–44 551.576.11:629.13

Glass, Kurt, **Wolkenbildung durch Flugzeug-Auspuffgase.** [Cloud formation by aircraft exhaust.] *Zeitschrift für angewandte Meteorologie*, 55:225–227, **1938.** ref. **DWB**—Two instances of condensation trail observation are reported with synoptic details. *Subject Headings:* **Condensation trails, Germany.**

2I–45 551.576.11:629.13

Kirk, T. H., **Dispersal of cloud by an aeroplane.** *Meteorological Magazine*, London, 73:41–42, **1938.** **DLC**—A well defined track of cloud dissolution was left by an airplane flying at 3000 ft. through a very thin layer of stratocumulus cloud beneath a strong inversion. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing, England.**

2I–46 551.576.11:629.13

Kuhlbrodt, E., **Flugzeug bewirkte auf seiner Bahn gleichzeitig Wolkenauflösung und Wolkenbildung.** [Aircraft caused simultaneous dissolution and formation of cloud along its path.] *Zeitschrift für angewandte Meteorologie*, 55:346–350, **1938.** 2 figs., 5 refs. **DWB**—The day was warm and sunny with clear sky over the water and cumulus castellatus above the land. The author believes that a very thin layer of haze was present, because a dark blue trail appeared first in the light blue sky behind the airplane. Broken clouds with a common base height formed in the hitherto cloudless sky, and cloud dissolution occurred along the airplane's path through the cloudy portion of the sky. Several other authors who observed similar phenomena are referred to and their theories briefly mentioned. *Subject Headings:* **Condensation trails, Negative condensation trails, Hamburg, Germany.**

1939

2I–47 551.576.11:629.13

Höhndorf, Fritz, **Eiswolken-Erzeugung in grösseren. . . . Flugzeugen.** [Formation of ice clouds by airplanes flying at high altitudes.] *Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters*, Berlin-Adlershof, *F.-B.* 1134, Nov. **1939.** 13 p. photos, graphs. Abstracted by Central Air Documents Office (ATI59932). Original unchecked.—"The condensation level of water vapor contained in exhaust gas is investigated for its effect on the formation of vapor trails behind airplanes flying at higher altitudes. The author develops formulas based on estimated values of speed, fuel consumption, relative humidity, and temperature at various altitudes. The mean values established in these calculations are presented on graphs, which indicate that condensation trails are formed even if the surrounding atmosphere at high altitudes is of low relative humidity." *Subject Headings:* **Condensation trails, Exhaust trails.**

2I–48 551.576.11:629.13

Schütte, C. E. C., **Een kunstmatige wolk.** [An artificial cloud.] *Hemel en Dampkring*, 37(7–8):278–280, July–Aug. **1939.** 3 photos. **NJP**—Occurrence on June 5, 1939 at 5700 m. over a wide area. Humidity, at −12°C., was 65% with respect to water and 89% with respect to ice. *Subject Heading:* **Condensation trails.**—*C.E.P.B.*

1940

2I–49 551.576.11:551.593.63

Albers, B., **Nebensonne an künstlichem Zirrus.** [Mock sun in artificial cirrus.] *Zeitschrift für angewandte Meteorologie*, 57:95–96, **1940. DWB**—A detailed account is presented of the growth, appearance, dissolution and after-effects of a parhelion observed in artificial cirrus caused by the passage of airplanes. The case was noteworthy because of the reversed order of colors and their brilliance. *Subject Headings:* **Condensation trails, Parhelia, Berlin, Germany.**

2I–50 551.576.11:629.13

Bishop, B. V., **Dissipation of cloud by aircraft at West Freugh, Stranraer.** *Meteorological Magazine*, London, 74:298–299, **1940. DLC**—Aircraft caused dissolution of thin stratocumulus at approximately 6000 ft. *Subject Headings:* **Condensation trails, Negative condensation trails, Scotland.**

2I–51 551.576.11:629.13

Butler, T., **Cloud making.** *Aeroplane*, London, 58(1501):294, March 1, **1940.** With comments by Edwin Colston Shepherd (ed.). **DLC, DBS**—Author assures his readers that the Germans have no monopoly on the formation of condensation trails behind aircraft. The trail observed was "probably above 20,000 ft." in supersaturated air. *Subject Headings:* **Condensation trails, Supersaturation, England.**

2I–52 551.576.11:629.13

Cloud making. *Aeroplane*, London, 58(1514):745, May 31, **1940.** With comments by Edwin Colston Shepherd (ed.) **DLC, DBS**—A fighter pilot relates his experience with vapor trails. The editor explains such trails as being caused by the addition of water vapor in exhaust to previously saturated air or the condensation of water vapor resulting from a drop in pressure associated with the passage of the airplane. Both types occur only at great heights. *Subject Headings:* **Condensation trails, Exhaust trails, England.**

2I–53 551.576.11:629.13

Cloud making at 2000 ft. *Aeroplane*, London, 58(1516):804, June 14, **1940. DLC, DBS**—A fighter pilot describes twin wing-tip trails which formed when a "hurricane" pulled up suddenly at an altitude of 2000 ft. on a clear day. *Subject Headings:* **Condensation trails, Wing tip trails, Adiabatic cooling.**

2I–54 551.576.11:629.13

Daragon, D., **Cloud-making in Finland.** *Aeroplane*, London, 58(1509):600, **1940. DLC**—Condensation trail formation behind aircraft in the low temperatures of high altitudes was a common phenomenon during the Finnish-Russian War. Trails persisted for several hours. *Subject Headings:* **Condensation trails, Exhaust trails, Finland.**

2I–55 551.576.11:629.13

Findeisen, W., **Merkblatt über Kondensfahnen hinter Flugzeugen.** [Leaflet on condensation trails behind airplanes.] Berlin, Reichsamt für Wetterdienst, **1940.** 13 p. **DAWS**—A monograph

on condensation trails divided into sections on the various forms of trails, the condition conducive to them, the formation of trails, and preventive precautions. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention, Condensation nuclei.**

2I–56 551.576.11:629.13

Georgii, Walter, **Aussprache. Die Entstehung von Eisnebel aus den Auspuffgasen von Flugmotoren.** [Comments on the origin of ice clouds in the exhaust of airplane engines.] *Deutsche Akademie der Luftfahrtforschung, Schriften*, 44:17–22, Mar. **1940.** 2 figs. 5 photos. Reprint available. *U. S. Dept. of Commerce Publication Board* (PB), *Report* No. 67845. **DLC**—Author compares the findings of ERNST SCHMIDT and E. HÖHNDORF concerning the temperatures at which clouds will form behind airplanes in saturated air. References are made also to AUFM KAMPE, WEICKMANN and ALFRED WEGENER. Vapor trail formation is shown diagrammatically as a function of temperature and humidity. *Subject Headings:* **Condensation trails, Supersaturation.**

2I–57 551.576.11:551.593.63:629.13

Kruisinga, J. C. M. and Pinkhof, M., **Kunstmatige wolken achter vliegtuigen.** [Artificial clouds by eight aircraft.] 1. By J. C. M. Kruisinga. Appendix by [T. van Lohuizen]. **II. Bijzon in kunstmatige wolk.** [Parhelion in artificial cloud.] By M. Pinkhof. *Hemel en Dampkring*, 38(1):29–32, Jan. **1940. NJP**—Dec. 21, 1939 a plane at 5,000 m. formed a long bow-shaped cloud due to exhaust moisture spread by turbulence. Another at 4,000 m. on Dec. 17, 100–150 km. long. Upper air data given. Compared with trails at Farnborough, 1932. A trail at Amsterdam, Dec. 27 gave a colored mock sun, showing that the trail consisted of ice crystals with vertical axes. *Subject Headings:* **Condensation trails, Exhaust trails, Turbulent mixing, Parhelia, Amsterdam, Netherlands.**

2I–58 551.576.11:629.13

Löhner, H., **Eisnebelstreifen hinter Flugzeugen in grossen Höhen.** [Ice-cloud streaks behind aircraft at great heights.] *Deutsche Luftwacht, Ausgabe Luftwissen*, 7:337–339, **1940.** 6 photos. **DLC**—Three distinct physical processes account for the formation of ice trails at high altitudes. 1) Sublimation or condensation by the addition of water vapor to unsaturated air. 2) Sublimation or condensation in supersaturated air by the addition of condensation nuclei. 3) Transformation of artificially engendered clouds into natural clouds by certain humidity conditions in the atmosphere. Excellent photographs are included. *Subject Headings:* **Condensation trails, Condensation nuclei, Supersaturation, Exhaust trails.**

2I–59 551.576.11:629.13

Miller, R. I. M., **Cloud making.** *Aeroplane*, London, 58(1503):374, **1940. DLC**—A report of personal observations of "smoke" trails and artificial clouds. *Subject Headings:* **Condensation trails, Exhaust trails, England.**

2I–60 551.576.11:551.593.63:629.13

Pinkhof, M., **Kunstmatige wolken op 12 April 1940.** [Artificial clouds on April 13, 1940.] *Hemel en Dampkring*, 38(5):230–231, May **1940.** fig. Addendum, *ibid.*, (6):260, June 1940. **NJP**—Description and photo of a trail at 5500–6000 m. W.S.W. of Amsterdam in a strong N. wind. Other trails on same day. Mock suns were observed. *Subject Headings:* **Condensation trails, Parhelia, Amsterdam, Netherlands.**—*C.E.P.B.*

2I–61 551.576.11:629.13

Roberts, E. D., **Dispersal of cloud by aircraft.** *Meteorological Magazine*, London, July **1940.** Typescript. **GB-MO**—On June 2, 1940, in a thin sheet of low ACu at 6000 ft., showing cellular structure, a clear path was formed more than three times the width of the plane. It is thought that the cloud sheet was disintegrating in dry air and the turbulence set up by the aircraft caused sufficient mixing for the water drops to evaporate. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing.**—*C.E.P.B.*

2I–62 551.576.11:629.13

Rushton, J. V., **Cloud making by sailplane.** *Aeroplane*, London, 58(1516):804, June 14, **1940. DLC, DBS**—A glider pilot reports witnessing the formation of a cloud around his plane at 5000 ft. Theoretically the plane's "circling in an ascending column of air accelerated the rate of ascension and caused condensation." *Subject Headings:* **Condensation trails, Adiabatic cooling.**

2I–63 551.576.11:629.13

Schmidt, Ernst, **Die Entstehung von Eisnebel aus den Auspuffgasen von Flugmotoren.** [The origin of ice clouds in the exhaust of airplane engines.] *Deutsche Akademie der Luftfahrtforschung,*

Schriften, 44:1–15, March **1940.** 3 figs., 2 tables, 3 refs., 5 equations. Reprint available. *U. S. Dept. of Commerce, Publication Board* (PB) *Report* No. 67845. **DLC**—The conditions for ice cloud formation in stable, nonsupersaturated air are analyzed. Diagrams illustrate, for low temperatures and pressures, under what atmospheric conditions at different altitudes ice cloud formation can be expected. Thereby it is shown that the type of fuel is of real importance. In conclusion the possible measures for controlling such ice formation are discussed. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention.**

2I–64 551.576.11:629.13

Visible vortices. Their formation established: wing tip and slip-stream trails: the evidence summarized. *Flight*, 38(1654):d-e, **1940.** 2 photos. **DLC**—The author divides condensation trails into two classes, wing-tip and slipstream trails. The former are observed at low levels when condensation occurs in strong wing-tip vortices. The latter result from the addition of condensation nuclei to air containing supercooled water vapor at high levels. *Subject Headings:* **Condensation trails, Exhaust trails, Wing tip trails, Visible vortices.**

2I–65 551.576.11:629.13

Visible vortices? White sky trails: a possible explanation. *Flight*, 38(1647):51, July 18, **1940.** illus. Comments, *ibid.*, 38:68, 86–87, 107–108, 1940. Correspondence. **DLC**—A popular account and explanation of visible vortices is given, and contribution of additional facts is requested. Correspondence: Numerous readers recorded their observations, which included negative trails and balloon-shaped cloud formations. *Subject Headings:* **Condensation trails, Negative condensation trails, Visible vortices, England, Melbourne, Australia.**

2I–66 551.576.11:629.13

Walker, C. C., Greenshields, H. L. and Turner, Keith, **Visible vortices; the exhaust as a potential producer; observations from close quarters; revealed by searchlights.** *Flight*, 38(1651):131, Aug. 15, **1940. DLC**—Walker points out the effects of the additions of water vapor to very cold or nearly saturated air. Greenshields adds an account of his personal close range observations of vapor trails. Turner suggests tracking enemy planes by following their vapor trails with searchlights. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices.**

1941

2I–67 551.576.11:629.13

Brooks, Charles F., **Spreading cirrus clouds formed during military airplane maneuvers over eastern Massachusetts.** *American Meteorological Society, Bulletin*, 22:234, May **1941. DLC**—Brief comments are made on photographs shown at the meeting in Washington, D. C., April 30, 1941. The cause was ascribed to condensation, convection and sublimation with rapid lateral spreading. *Subject Headings:* **Condensation trails, Artificial cirrus clouds, Massachusetts.**

2I–68 551.576.11:629.13

Dobson, G. M. B., **Condensation trails from aeroplane engine exhaust and meteorological conditions.** *Great Britain, Aeronautical Research Committee, Meteorology Sub-Committee, Report*, No. 4965, H.A.S. 43, T.A. 161, Feb. **1941.** 7 p. 4 figs. **GB-MO**—From data of gasoline consumption by the Spitfire III, calorific value and weight of water, the air temperature which just gives condensation or sublimation is calculated for different heights. The results are shown as curves for humidity 100, 50 and 0%, air temperature against cross-section of trail, for different heights. *Subject Headings:* **Condensation trails, Cloud physics research.**—*C.E.P.B.*

2I–69 551.576.11:629.13

Goldie, A. H. R., **Condensation trails from aircraft. Condensation of water vapour from engine exhaust.** *Great Britain, Aeronautical Research Committee, Meteorology Sub-Committee, Report* No. 5032, T 4066, T.A. 163a, March 26, **1941.** 8 p. 3 figs., 2 tables. **GB-MO**—Tables and diagrams show the increase or decrease of relative humidity over ice due to water vapor and heat from a Spitfire III in a trail of 30 sq. m. cross section at different heights and air temperatures. The recorded extreme temperatures, winter and summer, for England and Germany are also plotted. The possible effect of using condensers is discussed. *Subject Headings:* **Condensation trails, Cloud physics research, England, Germany.**—*C.E.P.B.*

2I–70 551.576.11:629.13

Goldie, A. H. R., **Condensation trails from aircraft. Results of ascents Nos. 1–52 at Boscombe Down.** *Great Britain, Aeronautical Research Committee, Meteorology Sub-Committee, Report* No. 5092, T.A. 165, May 5, **1941.** 4 p. fig. **GB-MO**—A summary of the temperature conditions for

light trails (100–200 m. long) and heavy persistent trails is given in a diagram. The amount of ice present is estimated as 0.002 g./m³ for light trails at point of disappearance and 0.004 g. or more for heavy trails. *Subject Headings:* **Condensation trails, Cloud physics research, England.**—*C.E.P.B.*

2I–71 551.576.11:619.13

Goldie, A. H. R., **Condensation trails from aircraft. Summary of present position.** *Great Britain, Aeronautical Research Committee, Meteorology Sub-Committee, Report* No. 5452, T.A. 181, Nov. 20, **1941.** 3 p. **GB-MO**—A summary of temperatures at which trails would be expected and a comparison with observations are included. Details requiring investigation are noted. *Subject Headings:* **Condensation trails, Cloud physics research.**—*C.E.P.B.*

2I–72 551.576.11:629.13

Goldie, A. H. R., **Formation of cloud behind aircraft.** *Great Britain, Aeronautical Research Committee, High Altitude Sub-Committee, Report* No. 4956, H.A.S. 42, T.A. 160, Feb. 3, **1941.** 7 p. table. **GB-MO**—Pressure reduction above and behind wings and propeller, supply of water vapor, nuclei of condensation, turbulence from propeller and electric charges are briefly discussed as factors favoring formation of trails. Only the water vapor from the exhaust is considered of practical importance. Factors tending to dissipate cloud are heat supplied by engine and the heat equivalent of work done by the propeller. *Subject Headings:* **Condensation trails, Exhaust trails, Saturation.**—*C.E.P.B.*

2I–73 551.576.11:629.13

Höhndorf, F., **Beitrag zum Problem der Vermeidung von Auspuffwolken hinter Motorflugzeugen.** [Contribution to the problem of avoiding exhaust clouds behind aircraft.] *Germany, Aerologisches Institut, Forschungsanstalt für Segelflug, Forschungsbericht* No. 1371, April 9, **1941.** 15 p. 2 figs., 3 tables, equations. *U. S. Dept. of Commerce, Publication Board* (PB) *Report* No. 37702. **DLC**—Author confines himself to a detailed, mathematical discussion of how much water vapor can be allowed in exhaust gas under given meteorological conditions before condensation trails form. He refers the reader to AUFM KAMPE for further comments on the subject. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention.**

2I–74 551.576.11:551.557:629.13

Horrocks, H., **Notes on the upper air ascents at Boscombe Down and the upper winds at Larkhill and Liverpool.** *Great Britain, Aeroplane and Armanent Experimental Establishment, Boscombe Down, High Altitude Development, Flight Report* No. 16, Oct. **1941.** 20+p. 19 figs., 15 tables. **NJP**—Report of 69 special ascents to 40,000 ft. at Boscombe Down. All trails were due to condensation of exhaust water. They are classified as faint short, dense short, faint persistent and dense persistent. Conditions for each type, their relation to cirrus, the synoptic situation, humidity, bumpiness and lapse rate are described. Persistent trails were not formed more than 1500 ft. above the tropopause. Evasive action is also discussed. A good deal of information is included on strong upper winds and changes of wind with height, time and distance. There are close-up photos of trails. *Subject Headings:* **Condensation trails, Exhaust trails, Upper air winds, Tropopause, England.**—*C.E.P.B.*

2I–75 551.576.11:629.13

Richards, E. J., **Note on wing-tip condensation trails.** *Great Britain, Aeronautical Research Committee, Report* No. 5429, T.A. 174, Ae. 1876, Nov. 8, **1941.** 3 p. 3 figs. Summary p. 3. **DAWS**—"Condensation trails must be expected on machines of very high wing loading on account of the stronger tip vortices. Wing tip shape has little effect on pressure reduction, but the elliptic wing gives the largest dissipation and therefore the shortest trail." *Subject Headings:* **Condensation trails, Wing tip trails, Adiabatic cooling, England.**

2I–76 551.574.1:551.576.1:551.577.11

Simpson, Sir George C., **On the formation of cloud and rain.** *Royal Meteorological Society, Quarterly Journal,* 67(290):99–133, April **1941.** 5 figs., 7 tables, 24 refs. **DLC**—An excellent summary of the physics of cloud formation, the knowledge of which is necessary for an understanding of exhaust trails. The relative importance of various types of condensation and sublimation nuclei is weighed. *Subject Headings:* **Condensation trails, Cloud physics research, Condensation nuclei, Sublimation nuclei.**

1942

2I–77 551.576.11:629.13

Bull, R. G. M. and Dixon, R. N., **Vapour trails; an unusual example; exhaust condensation or slipstream turbulence?** *Flight,* 41(1748):652, June 25, **1942.** **DLC**—Three trails were observed

behind a four engine airplane. DIXON doubts the explanations set forth by DE HAVILLAND and DARBISHIRE (*see item* 2I-79 below) of the fading "wake-like" vapor trail. *Subject Headings:* **Condensation trails, Exhaust trails, Turbulent wakes, England.**

2I–78 551.576.11:629.13

Cloud making. *Aeroplane*, London, 63(1636):408, 382, Oct. 2, **1942. DLC, DBS**—An exceptionally good photograph of wing-tip trails formed at approximately 200 ft. as the plane was climbing after a dive. *Subject Headings:* **Condensation trails, Visible vortices, Adiabatic cooling.**

2I–79 551.576.11:629.13

Dainty, Rex, Chillcott, A. and Darbishire, David H., **Vapour trails. Effect of four exhausts. Wake from a Fortress I. A question of supersaturation.** *Flight*, 41(1743):516, May 21, **1942. DLC**—Eyewitness observations of vapor trails are recounted by DAINTY and CHILLCOTT. DARBISHIRE's explanation of the fading "wake-like" trails observed by DIXON (*see item* 2I–82 below) and CHILLCOTT hinges on the physical fact that "the saturated vapour pressure exerted by a convex water surface is greater than that exerted by a flat surface." *Subject Headings:* **Condensation trails, Visible vortices, Saturated vapor pressure, England.**

2I–80 551.576.11:629.13

de Havilland, Geoffrey, R., Jr., **Condensation trails.** *Aeronautics*, 6(5):79, June **1942. DLC**—Author differentiates between the types of condensation trails formed by high and low-flying airplanes. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices.**

2I–81 551.576.11:629.13

de Havilland, Geoffrey R., Jr., **Vapour trails, views of a well-known test pilot.** *Flight*, 41(1745): 570, June 4, **1942. DLC**—The author wishes to correct false explanations of vapor trails advanced previously in *Flight*. He distinguishes between exhaust trails and adiabatic trails. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices.**

2I–82 551.576.11:629.13

Dixon, R. N., **Vapour trails fade like "wake" of a boat.** *Flight*, 41(1741):461, May 7, **1942. DLC**—An unscientific, descriptive account of vapor trails which behaved like the "stern wash of any boat" is given. *Subject Headings:* **Condensation trails, England.**

2I–83 551.576.11:629.13

Errington, G. B. S., **Home-made cirrus.** *Aeroplane*, London, 63(1624):32, July 10, **1942. DBS**—A colorful, nonscientific account of visible vortices is given. Mention is made also of "cloud tunneling," the dissipation of haze or cloud caused by the radiator and engine heat of an airplane. *Subject Headings:* **Condensation trails, Negative condensation trails, Visible vortices.**

2I–84 551.576.11

Fricke, H., **Der "Normalzustand des Fliessens" und seine Bedeutung für die Wolkenbildung.** [The "normal condition of flow" and its importance for cloud formation.] *Meteorologische Zeitschrift*, 59:22 **26, 1942.** 7 figs., 14 refs. **DLC**—Study of the "normal conditions of flow" opens new vistas for the understanding of cloud formation. The author contends that explanations of up and down air currents as caused by temperature differences or terrain are incomplete. He considers an understanding of the "normal conditions of flow" to be of great importance to meteorologists. *Subject Headings:* **Condensation trails, Cloud physics research, Aerodynamic theory.**

2I–85 551.576.11:629.13

Koschmieder, Harald, **Eine negative Flugzeugspur.** [A negative aircraft trace.] *Meteorologische Zeitschrift*, 59:271, **1942.** plate, ref. **DLC**—The author tells of receiving from O. PETERSEN a photograph of a streak of cloud dissolution caused by eddies through two air layers. The phenomenon has previously been illustrated by diagrams, but PETERSEN's photograph is the first of its kind. *Subject Headings:* **Condensation trails, Negative condensation trails, Turbulent mixing, Germany.**

2I–86 551.576.11:629.13

Pearson, H. A., **Progress in the investigation of condensation trails left by airplane in flight.** *U. S. NACA, CB*, March **1942.** 5 p. fig. **DAWS**—Conclusions are drawn regarding the total amount of water condensed by the wings per unit time. Extremely low temperatures, high temperature lapse rates, an increase in the ratio of power to air volume, and high relative humidities are conducive to exhaust trail formation, whereas temperature inversions are a retarding factor. Additional questions dealing with rate of condensation, size of nuclei, etc., are raised. *Subject Headings:* **Condensation trails, Exhaust trails, Temperature inversions.**

2I–87 551.576.11:629.13

Pratt, A., **Vapour trails near the ground.** *Aeroplane*, London, 62(1619):654, June 5, **1942.** With comments by Edwin Colston Shepherd (ed.). **DBS**—An unusual occurrence of wing-tip vapor trails at about 200–300 ft. is related. *Subject Headings:* **Condensation trails, Visible vortices, Adiabatic cooling, England.**

2I–88 551.576.11:629.13

Rhode, Richard V. and Pearson, Henry Adolph, **Condensation trails—where they occur and what can be done about them.** *U. S. NACA, L474*, Wash., Sept. **1942.** 7 p. 4 plates. **DLC**—A brief, non-technical discussion of various types of condensation trails is presented. Change of altitude and speed and avoidance of certain cloud layers are suggested as means of suppressing trails. Flying into the stratosphere will not necessarily cause cessation of trails. *Subject Headings:* **Condensation trails, Exhaust trails.**

2I–89 551.576.11:629.13

Treloar, H. M., **Report on formation of aeroplane cloud trails with reference to Australian and lower latitudes.** *Australia, Meteorological Service, Research Reports, Ser. 10*, No. 4, June 4, **1942.** 5+p. **DWB**—Some recorded observations of cloud trails are listed. A discussion of the formation of trails and a suggested explanation of their general confinement to levels above the −40°C. isotherm are given. The author supports Alfred Wegener's views on frost supersaturation. *Subject Headings:* **Condensation trails, Exhaust trails, Supersaturation, Australia.**

2I–90 551.576.11:629.13

Vapour trails in the making. *Aeronautics*, 6(4):24, May **1942.** **DLC**—A remarkable photograph of an aerodynamic trail actually in the process of formation on the upper edge of the tail of an aircraft passing through supercooled air. *Subject Headings:* **Condensation trails, Adiabatic cooling.**

2I–91 551.576.11:629.13

Weber, Theo, **Wolkenbildung durch Flugzeuge.** [Cloud formation by aircraft.] *Flugwehr und Technik*, Zürich, 4(8):204–205, **1942.** 9 refs., photo. **DLC**—Reference is made to the chief German research papers on artificial cloud formation and preventive measures. Various types of condensation trails are described and the importance of a study of them, in connection with the problem of icing, is pointed out. The author claims that trails appear most often at temperatures of −20°C. and −40°C. but do not form in the stratosphere. Emphasis is laid on addition of condensation nuclei, supersaturation and supercooling as causal agents. The heat of the exhaust gas tends to retard cloud formation. Changing fuel, cooling the exhaust, throttling the motor to reduce the amount of water vapor in the exhaust, and changing altitude are suggested as preventive measures. *Subject Headings:* **Condensation trails, Exhaust trails, Icing of aircraft, Condensation trail prevention, Alps, Switzerland.**

1943

2I–92 551.576.11:629.13

AAF studying vapor trails. *Aviation News*, 1:8, Aug. 23, **1943.** photo. **DBS**—A particularly vivid photograph of high altitude vapor trails created by a test pilot to facilitate study by the Army Air Forces' Materiel Command at Wright Field. *Subject Headings:* **Condensation trails, Exhaust trails, Ohio.**

2I–93 551.576.11:629.13

aufm Kampe, H. J., **Die Physik der Auspuffwolken hinter Flugzeugen.** [The physics of exhaust clouds behind airplanes.] *Luftwissen*, 10:171–173, **1943.** 3 photos, 5 diagrs. **DLC**—The author cites water vapor in exhaust gas as the chief cause of condensation trails. He mentions the military importance of preventing such trails and gives possible means of doing so. *Subject Headings:* **Condensation trails, Exhaust trails, Saturation, Condensation trail prevention.**

2I–94 551.576.11:551.593.63:629.13

Boerner, H., **Haloerscheinungen an Kondensfahnen.** [Halo phenomena in condensation trails.] *Zeitschrift für angewandte Meteorologie*, 60:397, **1943.** **DWB**—A report is given of halo phenomena observed over Uccle in condensation trails left by airplane flying through a previously only slightly cloudy sky. *Subject Headings:* **Condensation trails, Exhaust trails, Halos, Belgium.**

2I–95 551.576.11:551.593.63:629.13

Botley, Cicely M., **A mock sun in vapour trail cloud.** *Royal Meteorological Society, Quarterly Journal*, 69:155, **1943.** **DWB**—The author refers to D. S. Hancock's (*see item* 2I-100 below) article on the "Mock sun" and reports having seen a mock sun in the same vapor trail cloud from a different observation point. *Subject Headings:* **Condensation trails, Exhaust trails, Parhelia, England.**

2I–96 551.576.11:629.13

Butler, T., **Delayed action vapour trails.** *Aeroplane*, London, 65(1677):84, **1943. DLC**—The author questions the reason for the gap between a fast plane and its condensation trail. *Subject Headings:* **Condensation trails, England.**

2I–97 551.576.11:629.13

§**Condensation trails.** *U. S. Air Force, Weather Central Division, Report* No. 52, **1943.** 27 p. 17 figs., 2 tables, equations. **DAWS**—The altitudes and temperatures favoring formation, possible preventive measures, prediction possibilities and tactical importance of each type of condensation trail are summarized in table I on p. 2. Drawings, photographs, and synoptic charts amply illustrate the appearance of the various trail types and explain them meteorologically. Considerable attention is given to discussion of preventive measures and prediction methods, particularly for exhaust type trail. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices, Condensation trail prevention.**

2I–98 551.576.11:629.13

§**Condensation trails.** *U. S. Air Force, Weather Central Division, Report, Supplement* No. 52, Oct. **1943.** 6 p. 3 figs., equations. **DAWS**—A graphic method for forecasting exhaust trails is presented. The report notes the necessary items of data, how to obtain them and how to use them. An upper level adiabatic chart, a pseudo-adiabatic diagram, and charts for determining trail areas are included. *Subject Headings:* **Condensation trails, Exhaust trails.**

2I–99 551.576.11:629.13

The formation of condensation trails behind aircraft in flight. *Great Britain, Naval Meteorological Branch, Meteorological Memoirs*, No. 15, **1943.** 4 p. 2 tables. **DAWS**—Three possible causes of condensation trails are considered: 1) adiabatic cooling on upper surfaces of wings, 2) adiabatic cooling in vortices and 3) supersaturation. A table is included which shows the ratio of increase of mixing ratio to increase of temperature required to keep the air saturated. A second table gives the limiting temperature for each pressure level above which trails cannot be formed from the exhaust in saturated air. It is believed that few trails of type (3) would form in the stratosphere because of the low relative humidity. *Subject Headings:* **Condensation trails, Exhaust trails, Supersaturation, Adiabatic cooling.**

2I–100 551.576.11:551.593.63:629.13

Hancock, D. S., **A mock sun in the vapour-trail cloud.** *Royal Meteorological Society, Quarterly Journal*, 69:46, **1943. DWB**—The vapor trails of at least 50 airplanes coalesced and formed two long clouds of intermediate structure. A mock sun of a faint red color formed on the under side of the longer cloud. *Subject Headings:* **Condensation trails, Exhaust trails, Parhelia, England.**

2I–101 551.576.11:551.524.7

Jones, F. M., **Maximum and minimum temperatures in the upper air.** *Great Britain, Meteorological Research Committee, M.R.P.* 150, Oct. 30, **1943.** 3 p. 2 figs., 2 tables, 4 refs. **DAWS**—The immunity line for condensation trails is plotted on graphs of the summer and winter, maximum and minimum upper air temperatures for England, Alaska, the Northern United States and the Southern States. *Subject Headings:* **Condensation trails, Exhaust trails, Upper air temperatures, England, Alaska, United States.**

2I–102 551.576.11:629.13

Keil, Karl, **Physik der Auspuffwolken (Kondensstreifen) hinter Flugzeugen.** [Physics of the condensation trails behind airplanes.] *Zeitschrift für angewandte Meteorologie*, 60:404, **1943.** 3 refs. **DWB**—A brief summary is given of explanations by W. Peppler, Humphreys and H. Kirsten of the physical causes of condensation trails behind aircraft. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation nuclei, Supersaturation.**

2I–103 551.576.11:629.13

Lossnitzer, H., **Bildung von Kondensfahnen durch Wirbelzöpfe.** [Formation of condensation trails in air foil vortices.] *Meteorologische Zeitschrift*, 60:171, **1943. DLC**—Examples of condensation trails are cited to prove that such trails result not only from condensation in the exhaust gases but also from adiabatic cooling occurring in the centers of the air foil vortices. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices, U.S.S.R.**

2I–104 551.576.11:629.13

Parker, A. E., **On the formation of condensation trails.** *Great Britain, Meteorological Office, Synoptic Div., Technical Memorandum* No. 42, Jan. 27, **1943.** 9 p. 6 figs., 8 refs., 4 equations.

DAWS—Condensation trails most often result from the mixing of exhaust gases with saturated air combined with the adiabatic cooling due to the pressure reduction in vortices. It is shown mathematically that lowering the humidity or increasing the mixing ratio "lowers the temperature at which trails commence." Condensation trails should cease in the stratosphere if the mixing ratio (grams of air which mix with 1 gr. of exhaust gas) is large and the humidity low. A summary of the fundamentals of the Lanchester-Prandtl theory of the aerofoil is included to explain why the degree of pressure reduction in vortices is directly proportional to the span loading and inversely proportional to speed and air density. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices, Stratosphere.**

2I–105 551.576.11:629.13

Wolkenbildung durch Flugzeuge. [Cloud formation by aircraft.] *Flugsport*, Frankfurt a.M., 35(11):151–152, **1943.** 4 photos. **DLC**—Close range photographs of exhaust trails are included. A suggested preventive measure against trails, which are caused by the condensation of water vapor contained in hot exhaust gases, is the cooling of those gases. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention.**

1944

2I–106 551.576.11:629.13:016

†**Cloud formation and dispersal by aeroplanes, 1935–1942.** *London, Science Museum, Science Library, Bibliographical Series*, No. 603, **1944.** 1 p. **DLC**—A British bibliography containing references chiefly to the *Meteorological Magazine*, 1935–1942. *Subject Heading:* **Condensation trails.**

2I–107 551.576.11:629.13:016

†**The dissipation of natural fog, 1931–1941.** *London, Science Museum, Science Library, Bibliographical Series*, No. 602, **1944.** 1 p. **DLC**—A British bibliography with references to articles in English, French, Italian and German. Two articles on the dissipation of fog by airplanes are included. *Subject Headings:* **Condensation trails, Negative condensation trails.**

2I–108 551.576.11:629.13

Goldie, A. H. R., **Condensation trails from bomber aircraft.** *Great Britain, Meteorological Office, Synoptic Div., Technical Memorandum* No. 83, July **1944.** 6 p. 2 figs. **DAWS**—Examinations of various bomber types reveals that the "difference between different aircraft from the point of view of the production of exhaust trails is small." A knowledge of the diurnal temperature variation in air masses aloft and the wind direction is valuable in forecasting supersaturation and therefore condensation trails. De-icing equipment is ineffectual against condensation trail formation. *Subject Headings:* **Condensation trails, Exhaust trails, Supersaturation.**

2I–109 551.576.11:629.13

Heiërman, J. H., **Vliegtuigwolken.** [Clouds formed by aircraft.] *Hemel en Dampkring*, 42(6):101–109, June **1944.** 7 figs., table, 19 refs. **NJP**—After a brief summary of the early literature, condensation on ice nuclei is simply explained and the effect of water added to the air by aircraft exhaust is calculated. Seventeen specific cases of trails are discussed with values of temperature and humidity. Phenomena are related to halo formation. Counter measures are discussed. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation nuclei, Halos, Condensation trail prevention.**—*C.E.P.B.*

2I–110 551.576.11:629.13

Held, A. and Dietz, O., **Versuch über die Minderung der Kondensstreifenbildung durch Zumischung von Schwefelkohlenstoff zum Kraftstoff.** [Experiments on the reduction of condensation trails by additions of carbon disulphide to the fuel.] *Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters*, Berlin-Adlershof, *U. M.* 761, April **1944.** 14 p. diagr., graphs. English translation: *U. S. Dept. of Commerce, Publication Board* (PB), *Report* No. 96113. 5 p. 5 graphs. **DLC**—Original unchecked. To combat the condensation of excessive water vapor in exhaust gases, a mixture of aviation fuel and CS_2 which contains no hydrogen whatever, was tried in place of normal fuel containing hydrogen. The results show that the admixture of CS_2 to aviation fuel raises the ceiling above which condensation trails will form. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention.**

1945

2I–111 551.576.11:629.13

Darwin, J. M., **Vapour trails.** *Aeroplane*, London, 68(1756):92, Jan. 19, **1945.** Comments by ed. **DLC**—The editor answers a reader's questions about vapor trails. He divides vapor trails into three classes by origin: those caused by condensation within a corkscrew eddy, those resulting

from condensation when hot exhaust gases meet cold air, and those formed when the atmosphere is densely charged with water drops. *Subject Headings:* **Condensation trails, Negative condensation trails, Exhaust trails, Visible vortices.**

2I–112 551.576.13:551.593.63:629.13

Descamps, Alphonse M., **Les traînées blanches d'avions.** [White trails of aircraft.] *Belgium, Institut Royal Météorologique, Miscellanées*, Fasc. 17, **1945.** 23 p. 4 figs., biblio. p. 22–23. **DWB**—A brief historical note precedes a discussion of special kinds of condensation trails and similar phenomena. A discussion of condensation or solidification of water vapor and proposed explanations of condensation trails are included. An account is given of the appearance of halo phenomena in condensation trails, and means for combating such trails are mentioned. *Subject Headings:* **Condensation trails, Exhaust trails, Halos, Condensation trail prevention.**

1946

2I–113 551.576.11:629.13

Brewer, A. W., **Condensation trails.** *Weather*, 1(2):34–40, June **1946.** 3 figs., plate. **DLC**—Trails are classified as resulting from water in the exhaust, supersaturation, and aerodynamic effects. A brief theoretical discussion of exhaust trail theory as worked out by G. M. B. Dobson and A. H. R. Goldie (*see items* 2I-68 and 2I-69 above) is presented. Figures demonstrating the variation of temperature, frost point and condensation trail length, as well as the variation of trail length with humidity and the depression of the air temperature below the calculated critical temperatures, are included. *Subject Headings:* **Condensation trails, Exhaust trails, Wing tip trails.**

2I–114 551.576.11:629.13

Great Britain. Meteorological Office, **Condensation trails from aircraft.** London, H.M. Stationery Office, **1946.** 10 p. 4 figs., tables, 9 refs. (M.O. 479.) **DWB**—An outline is presented of the physical factors which could favor formation of cloud behind aircraft and those which would tend to prevent cloud formation or dissipate existing clouds. The relation between the heating effects of exhaust and its moisture content is given in equation form. Reference is made to Findeisen's theory of nuclei of sublimation. *Subject Headings:* **Condensation trails, Negative condensation trails, Sublimation nuclei**

2I–115 551.576.11:629.13

Great Britain, Meteorological Office, **Condensation trails. Notes for use of pilots.** London, H.M. Stationery Office, **1946.** 5 p. 3 figs., tables. (M.O. 480.) **DLC**—After a brief theoretical explanation of exhaust trails, wing-tip and propeller trails are described. A summary of the Boscombe Down experiments is given and hints are included on means of avoiding the formation of condensation trails. *Subject Headings:* **Condensation trails, Exhaust trails, Visible vortices, Condensation trail prevention, England.**—*C.E.P.B.*

2I–116 551.576.11:629.13

Sander, Adolf, **Die Vermeidung von Kondensstreifen hinter Flugzeugen.** [The avoidance of condensation trails behind airplanes.] *Great Britain, Ministry of Supply, Report of Transactions*, No. 178, **1946.** English summary p. 1–4. Original unchecked.—Author claims the removal of condensation nuclei from the exhaust by means of a secondary combustion chamber would prevent vapor trail formation. *Subject Headings:* **Condensation trails, Exhaust trails, Condensation trail prevention.**

1947

2I–117 551.576.11:629.13

Küttner, Joachim, **Beobachtungen an Kondensfahnen.** [Observations of condensation trails.] *Zeitschrift für Meteorologie*, 1:183–185, **1947.** fig., 4 refs. **DWB**—Condensation trails resulting from causes other than the addition of water vapor (i.e. turbulence, decrease in pressure, or up-draft) are reported. Instances of negative condensation trails, resulting from the downdraft effect caused by a plane, by turbulence, or by pressure increase particularly in connection with a moisture content discontinuity on the lower side of certain cloud layers, are cited. Comments are made also on the combined phenomena of positive and negative condensation trails. *Subject Headings:* **Condensation trails, Negative condensation trails.**

1948

2I–118 551.576.11:629.13

Aanensen, C. J. M., **Unusual condensation trails.** *Meteorological Magazine*, London, 77:17–18, **1948.** Comments by F. H. Dight, *ibid.*, p. 116–117. **DLC**—November 29, 1947, West Walling, 300–400 mb., dense persistent trails formed by propellers. Synoptic situation given. *Subject Headings:* **Condensation trails, Propeller trails, England.**—*C.E.P.B.*

2I–119 551.576.11:629.13

Hunt, T. L., **Low-level condensation trails.** *Meteorological Magazine*, London, 77:181–182, **1948.** **DLC**—Nonpersistent vapor trails on March 8, 1948 at a height of only 300–400 ft. over much of the upper surface of an airplane's wings were observed. Synoptic situation given. *Subject Headings:* **Condensation trails, Adiabatic cooling, England.**—*C.E.P.B.*

2I–120 551.576.11:629.13

Poulter, R. M., **Man-made cirrus?** *Weather*, 3:232, **1948.** 2 plates. **DLC**—A path 600 yards wide with a centrally placed band of cirrus was cleared in altocumulus by aircraft. *Subject Headings:* **Condensation trails, Negative condensation trails, England.**—*C.E.P.B.*

1949

2I–121

DELETED

2I–122 551.576.11:629.13

McLarren, Robert, **Jet engines accent vapor trails.** *Aviation Week*, 50(1):24–25, Jan. 3, **1949.** photo. **DLC**—"Tactical advantage of high altitude surprise may be nullified by intensity and extent of tell-tale paths," often 100 miles long. A change of altitude or power setting seems the only remedy at present. *Subject Headings:* **Condensation trails, Jets, Condensation trail prevention.**

2I–123 551.576.11:629.13

Prügel, Heinrich, **Vorverlegung eines Cirrostratus-Aufzuges durch Kondensstreifen.** [Extension of a cirrostratus train by condensation streaks.] *Meteorologische Rundschau*, 2(9–10):290, Sept.–Oct. **1949.** **DWB**—Sheet of Ci-st spread rapidly during air battle at 9,000 m. over Balkans and gave halo complex. (*Same abstract* as No. 5–70 in May *Meteorological Abstracts.*) *Subject Headings:* **Condensation trails, Halos, Balkans.**—*C.E.P.B.*

1950

2I–124 551.576.11:629.13

Bannon, J. K., **A note on frost-point observations in relation to aircraft condensation trails.** *Great Britain, Meteorological Research Committee, M.R.P.* 576, Aug. **1950.** 4 p. 2 figs., 4 tables. **DAWS**—The occurrence of condensation trails, presistent and non-persistent, on high altitude ascents appears to bear little relation to observed humidities. The remaining obvious variable governing the formation and persistence of trails would be condensation and sublimation nuclei. *Subject Headings:* **Condensation trails, Exhaust trails.**

2I–125 551.576.11:629.13

Ganesan, V., **Man-made cirrus?** *Indian Journal of Meteorology and Geophysics*, Delhi, 1(1):80–81, **1950.** 2 photos, 2 refs. **DWB**—Photographs are included of distinct parallel streaks formed in a "perfectly clear sky" behind four B 17's flying at about 30,000 ft. It seems probable that the clouds were formed by the action of the propellers. *Subject Headings:* **Condensation trails, Propeller trails, Karachi, Pakistan.**

2I–126 551.576.11

Perrie, D. W., **Cloud physics.** New York, **1950.** 119 p. 30 plates, 4 fold. tables, biblio. p. 109–114. **MH-BH**—On p. 35 under the heading "Artificial cloud" a comparison is drawn between the cooling of the air and the addition of water vapor resulting from the passage of an airplane and the principle cloud-forming influences. When these factors are sufficiently pronounced and the air is nearly saturated, condensation or sublimation with resultant cloud formation may occur. (*Same item* as No. C-99 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **Condensation trails, Artificial cirrus clouds.**

2I–127 551.576.11

Süring, Reinhard Joachim, **Die Wolken.** [The clouds.] 3d ed. *Probleme der kosmischen Physik*, Vol. 16. Leipzig, **1950.** 153 p. 4 figs., 12 tables. **DLC**—On p. 68–70 of the third

chapter a brief summary is given of the two main types of artificial clouds, those formed over fire and those formed by the passage of airplanes. Reference is made to the chief authors in each field. *Subject Headings:* **Condensation trails, Artificial cirrus clouds, Condensation nuclei.**

1951

2I–128 551.576.1:629.135

Applegate, T. H., **Condensation trails.** *Meteorological Magazine*, London, 80(946):119–120, April **1951.** photo. **MH-BH**—The photo shows condensation trails and their shadows on a sheet of high ACu. The trails were probably seen through the cloud. *Subject Headings:* **Condensation trails, Aerial navigation.**—*C.E.P.B.*

SUPPLEMENTARY MATERIAL

2I–129 551.576.11:629.13

Rhode, Richard V., **Observation of condensation trails formed by the XC-35 airplane over Langley Field, Va., July 17, 1941.** *U. S. NACA, CB*, Langley Field, Va., Sept. **1942.** 16 p. **DAWS**—Unchecked. *Subject Headings:* **Condensation trails, Virginia.**

2I–130 551.576.11:629.13

Rhode, Richard V. and Pearson, H. A., **Notes on prediction and elimination of exhaust type condensation trails.** *U. S. NACA, Bulletin*, Langley Field, Va., Sept. **1942.** 10 p. 2 tables, equation. **DAWS**—The paper was prepared to show the influence of airplane and atmospheric characteristics on the turbulent wake into which the exhaust moisture is discharged and diffused. Exhaust heating is not taken into consideration. A computation form used to predict exhaust trails is included. *Subject Headings:* **Condensation trails, Exhaust trails, Turbulent wakes, Condensation trail prevention.**

2I–131 551.574.7:016

†Kramer, Harris P., **Selective annotated bibliography on icing.** *Meteorological Abstracts and Bibliography*, 1(9):593–619, Sept. **1950. MH-BH**—Certain items dealing with the synoptic free-air conditions for icing (I–40), supercooled water (I–63) and the physical aspects of ice formation (I–171, 174) are of value for the understanding of condensation trail theory. *Subject Headings:* **Icing of aircraft, Bibliographies.**

2I–132 551.509.67:551.576:016

†Kramer, Harris P. and Rigby, Malcolm, **Selective annotated bibliography on cloud physics and "rain making."** *Meteorological Abstracts and Bibliography*, 1(3):174–205, March **1950. MH-BH**—The first section on "Physics of precipitation formation and condensation" contains several items on cloud physics and precipitation (C–16) or the physical processes of cloud formation (C–18) which are pertinent to the study of condensation trails. *Subject Headings:* **Cloud physics, Artificial precipitation, Bibliographies.**

2I–133 551.576.11:629.13

†Schaefer, Vincent J., **Localized effects induced by seeding supercooled clouds with dry ice and silver iodide.** *Western Snow Conference, Proceedings, 19th Annual Meeting*, July **1951.** p. I–XI. 20 refs. **DWB**—Author discusses seeding of clear air, stratus clouds, and cumulus clouds, overseeding, and natural seeding including several recent experiments which proved successful from a scientific point of view. Seeding of clear areas produced large masses of fine ice crystals under certain conditions. When exhaust trails were being formed behind the plane, seeding of the clear air did not change the situation one way or another. Ice crystals found in vapor trails consisted of "small hexagonal columns and clustered columns which may have formed on frozen water drops from the condensation trails." *Subject Headings:* **Condensation trails, Exhaust trails, Cloud seeding, Project Cirrus.**—*M.R.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only, and will not be listed in either the author or subject indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

American Meteorological Society, Bulletin, Volume 32, Number 6, June 1951.

Presentations of awards, 109th National Meeting, 31st Annual Meeting, p. 199–204.

Fritz, Sigmund and MacDonald, Torrence H.: **Measurements of absorption of solar radiation by clouds,** p. 205–209.

Jorgense, Donald L.: **A long-term fluctuation in early fall precipitation in California,** p. 210–213.

Denton, Robert L.: **A thermocouple voltage amplifier for temperature recording,** p. 214–216.

Laskowski, B. R.: **Soil moisture reporting by a Weather Bureau State Service,** p. 216.

Bellaire, F. R. and Anderson, L. J.: **Thermocouple psychrometer for field measurements,** p. 217–220.

Jorgensen, R. C. and Gerdes, W. F.: **The Dow Chemical Company leads industry in using radar for hurricane detection,** p. 221–224.

Ciel et Terre, Volume 67, Number 1–2, January–February 1951.

Contains no articles in Meteorology.

Ciel et Terre, Volume 67, Number 3–4, March–April 1951.

Vandenplas, A.: **Le temps en Belgique pendant l'année 1950,** [The weather in Belgium during 1950], p. 42–50.

Ciel et Terre, Volume 67, Number 5–6, May–June 1951.

Lardinois, Émile: **Observations phénologiques à Uccle (I.R.M.) pour l'année 1950,** [Phenological observations at Uccle (I.R.M.) in 1950], p. 101–104.

Geofisica Pura e Applicata, Volume 19, Number 3–4, 1951.

Van Mieghem, Jacques: **Les bilans énergétiques en météorologie dynamique,** [Energy balance in dynamic meteorology], p. 159–166.

Truesdell, C.: **Proof that Ertel's vorticity theorem holds in average for any medium suffering no tangential acceleration on the boundary,** p. 167–169.

Wegener, Kurt: **Die wirkliche Solarkonstante,** [The true solar constant], p. 170–172.

Meinhold, Heinz: **The wave form of atmospherics,** p. 173–175.

Meinhold, Heinz: **Die elektrische Ladung eines Flugzeuges bei Vereisung in Quellwolken,** [The electrical charge of an airplane by icing in thunderclouds], p. 176–178.

Hoeck, E. and Thams, J. Chr.: **Zum Problem der Niederschlagsmessung,** [On the problem of precipitation measurement], p. 220–226.

Berg, Hellmut: **Bericht über die agrarmeteorologische Tagung in Stuttgart-Hohenheim 14.–15. April 1951,** [Report on the agro-meteorological meeting in Stuttgart-Hohenheim, April 14–15, 1951], p. 227–230.

Journal of Meteorology, Volume 8, Number 4, August 1951.

Long, Robert R.: **A theoretical and experimental study of the motion and stability of certain atmospheric vortices,** p. 207–221.

Kellogg, William W. and Schilling, Gerhard F.: **A proposed model of the circulation in the upper stratosphere,** p. 222–230.

Clapp, Philip F. and Winston, Jay S.: **A case study of confluence as related to the jet stream,** p. 231–243.

Yerg, Donald G.: **Ionospheric wind systems and electron concentrations of the F layer,** p. 244–250.

Namias, Jerome: **The great Pacific anticyclone of winter 1949–50: a case study in the evolution of climatic anomalies,** p. 251–261.

Fultz, Dave: **Non-dimensional equations and modeling criteria for the atmosphere,** p. 262–2(
Blanchard, Duncan C.: **A verification of the Bally-Dorsy theory of spicule formation of sl**
pellets, p. 268–269.
Houghton, Henry G.: **The solar constant,** p. 270.

Journal Scientifique de la Météorologie, Volume 3, Number 10, April–June 1951.

Vialar, J.: **Analyse du champ de divergence,** [Analysis of the field of divergence], p. 37–56.
Perlat, A.: **Note sur la correction des indications d'un altimètre en fonction de la températu**
de l'air observée au niveau du vol, [Note on the correction of altimeter readings as
function of the air temperature at the level of flight], p. 57–61.
Facy, L.: **Embruns et noyaux de condensation,** [Fog and condensation nuclei], p. 62–68.
Maulard, J.: **Mesure du nombre de gouttes de pluie,** [Measurement of the amount of rai
drops], p. 69–73.

Meteorological Magazine, Volume 80, Number 949, July 1951.

Vilhelm F. K. Bjerknes, p. 181.
Lacy, R. E.: **Distribution of rainfall round a house,** p. 184.
Watson, R. A.: **Variability of percentage annual rainfall over short distance in Scotland,** p. 18
Letters to the Editor
"John Constable's clouds," p. 195.
Duststorm at North Front, Gibraltar, p. 196.
Ablation in the Scottish Highlands, p. 198.
Ablation of snow deposits, p. 199.
Notes and News
Funnel cloud at Palisadoes, Jamaica, p. 199.
Abnormal rainfall, Trinidad and Barbados, p. 200.
Waterspouts at West Kirby, Cheshire, and Llandudno, Caernarvon, p. 200.
Extreme upper air temperature over the British Isles, p. 200.
Shielded thermometer mounts, p. 203.
New Japanese meteorological publication, p. 204.
Present position of the Meteorological Service in Japan, p. 204.
Reviews
Lamb, H. H.: **Die Intensität der zonalen Zirkulation in der freien Atmosphäre aussertropisch**
Breiten, [The intensity of the zonal circulation in the free atmosphere of extratropic
latitudes], by H. Flohn, p. 206.
Ward, A.: **An investigation on some aspects of the effect of land and sea breezes, by F. Balkem**
p. 208.

Meteorological Magazine, London, Volume 80, Number 950, August 1951.

Belasco, J. E.: **Freezing days in Great Britain,** p. 213.
Effect of heavy rain on pilot balloons, p. 225.
Letters to the Editor
Grant, D. R., Frith, R. and Shelland, H. C.: **High-level cloud photographs,** p. 229.
Windass, C.: **Precautions to prevent sea-gulls stealing sunshine cards,** p. 230.
Notes and News
Napier Shaw Library, Cambridge, p. 230.
Imrie, B. H.: **Temporary formation of a surface inversion as a consequence of wintry shower**
p. 231.
Beynon, A.: **Arctic flight by aircraft of R.A.F. Station, Shawbury,** p. 233.
Expedition to northern Norway, p. 235.
Smith, L. P.: **Random errors in standard observations,** p. 236.
Halo phenomena at Gatow, p. 237.
Bulletin du service Météorologique de (*sic*) **Congo Belge,** p. 238.

Meteorologische Rundschau, Volume 4, Number 5–6, May–June 1951.

Kleinschmidt, Ernst, jun.: **Über Aufbau und Entstehung von Zyklonen. III Teil,** [On origi
and development of cyclones. Pt. III], p. 89–96.
Schwerdtfeger, Werner: **Gedanken über ein Ausgleichs-Prinzip des atmosphärischen Gesamt**
Niederschlages, [Ideas on a smoothing principle for total atmospheric precipitation]
p. 96–97.
Schirmer, Hans: **Niederschlagsstreifen—Spurlinien von Wolkenstrassen,** [Precipitatio
streaks—traces of cloud-lanes], p. 97–99.

Faust, Heinrich: **Extremtemperaturen bei Aufheiterungen nach einer Schlechtwetterperiode,** [Extreme temperatures during clearing after a period of bad weather], p. 99–100.
Horney, Günther, **Vorschläge für die Durchführung von Messungen des Wärme- und Wasserhaushaltes von Kulturpflanzenbeständen,** [Proposals for carrying out measurements of the heat and water economy of crop-stands], p. 100–103.
Arzt, Theodor: **Messungen der Extremtemperaturen in kleinen Hütten und ihre Fehler,** [Measurements of extreme temperatures in small screens and their errors], p. 103–105.
Nagel, F.: **Ein neuartiges Thermometer für Radiosonden,** [A new type of thermometer for radiosondes], p. 105–107.
Wegener, Kurt: **Messungen der Sonnenstrahlung zur Prüfung der Solarkonstante,** [Measurements of solar radiation as a check on the solar constant], p. 109–110.
Strüder, Paul: **Die Meteorologie des Descartes,** [Descartes' meteorology], p. 110.
Malsch, Wolfgang: **Einige Beobachtungen der hochatmosphärischen Störung Ende September 1950,** [Some observations of the upper atmospheric disturbance at the end of Sept. 1950], p. 110.
Heybrock, Werner: **Trombe über dem Schwarzwald-Rand,** [Spout over the Black Forest margin], p. 111.

Meteorological Society of Japan, Journal, 2nd Series, Volume 29, Number 6, June 1951.

Ogawara, M., Ozawa, T. and Tomatsu, K.: **Diagrams of confidence limits of occurrence probability,** p. 181–193.
Kamiko, T.: **The distribution of vertical instability in the neighborhood in tropical cyclones,** p. 194–198.
Takeda, K.: **Rainfall in forest,** p. 199–212.

Monthly Weather Review, Volume 79, Number 4, April 1951.

Tepper, Morris: **On the desiccation of a cloud bank by a propagated pressure wave,** p. 61–71.
Winston, Jay S.: **The weather and circulation of April 1951,** p. 71–73.
Kibler, C. L.: **The deepening storm over Illinois on April 11–12, 1951,** p. 74–80.

Monthly Weather Review, Volume 79, Number 5, May 1951.

Schmidt, R. C.: **A method of forecasting occurrence of winter precipitation two days in advance,** p. 81–95.
Clem, LeRoy H.: **The weather and circulation of May 1951,** p. 96–99.
Carr, J. A.: **The East Coast "backdoor" front of May 16–20, 1951,** p. 100–105.

Tellus, Volume 3, Number 2, May 1951.

Fultz, Dave and Long, Robert R.: **Two-dimensional flow around a circular barrier in a rotating spherical shell,** p. 61–68.
Lundbak, Asger: **Aeromagnetic survey of vertical intensity over the sound with apparatus of the BMZ type,** p. 69–74.
Van Mieghem, Jacques: **Le mouvement des tourbillons atmosphériques,** [Movement of atmospheric vortices], p. 75–77.
Lowell, S. C.: **The boundary conditions at the tropopause,** p. 78–81.
White, Robert M.: **The meridional flux of sensible heat over the Northern Hemisphere,** p. 82–88.
Nyberg, Alf and Schmacke, E.: **Eddy flux of heat and momentum during two years at Stockholm-Bromma,** p. 89–99.
Rex, Daniel F.: **The effect of Atlantic blocking action upon European climate,** p. 100–111.
Dieterichs, Heinz: **Das Halophänomen in Nyköping am 3. Okt. 1580,** [Halo phenomenon in Nyköping on Oct. 3, 1580], p. 113–114.
Hovmöller, Ernest: **International Congress on Alpine Meteorology,** p. 114–115.

Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia, Volume 83, Number 1, Jan.–Feb. 1951.

Selishchenskaia, A. A.: **Obzor fenologicheskikh nabliudenii za leto 1950 g.,** [Review of phenological observations made during the summer of 1950], p. 84–86.

Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia, Volume 83, Number 2, March–April 1951.

Khromov, S. P.: **O sovremennom sostoianii klimatologii,** [Modern climatology], p. 117–128.
Rudenko, A. I.: **Sostoianie, znachenie i zadachi sovetskoĭ fenologii,** [The status, significance and tasks of soviet phenology], p. 141–151.

Zhakov, S. I.: **Ob issledovanii geograficheskikh osobennosteĭ proiskhozhdeniia atmosfernykh osadkov,** [Studies of the geographic characteristics of the sources of atmospheric precipitation], p. 156–160.

Brudin, I. D.: **Snezhnye buri v otrogakh iuzhnogo Predural'ia,** [Snow storms in the spurs of the southern Urals], p. 205–206.

Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia, Volume 83, Number 3, May–June 1951

Sapozhnikova, S. A.: **Nekotorye osobennosti klimata oazisov v usloviiakh Sredneĭ Asii,** [Some peculiarities of the climate of oases under Central Asiatic conditions], p. 231–235.

Mel', M. I.: **O meteorologicheskikh issledovaniiakh osobo ekspeditsii lesnogo departamenta pod rukovodstvom V. V. Dokuchaeva,** [On meteorological research of special expeditions of the forestry department under the leadership of V. V. Dokuchaev], p. 291–299.

Weatherwise, Volume 4, Number 4, August 1951.

Burgner, Newton M.: **The origin and detection of hurricanes,** p. 75–78, 87.

Flood disaster in Kansas, p. 79, 83.

Neuberger, Hans H.: **Halos,** p. 80–83.

Federer, Charles A.: **The annual eclipse of September 1st,** p. 84–86.

Elliott, Robert D.: **Increasing precipitation through cloud seeding,** p. 88–90.

McQuarrie, A. F. and Pickering, C.: **A record June snowstorm at Calgary, Alberta,** p. 91–92.

Wetter und Leben, Volume 3, Number 5–7, June 1951.

Schulze, Rudolf: **Untersuchungen im Rahmen der Hamburger medizinmeteorologischen Arbeiten. (Strahlungsphysiologische Arbeiten in Wyk an Föhn.),** [Investigations in the sphere of the Hamburg medical-meteorological works. (Radiation physiological work in Wyk on Föhn.)], p. 81–85.

Steinhauser, F.: **Ergebnisse und Aufgaben stadtklimatischer Untersuchungen in Wien,** [Results and problems of urban climatological investigations in Vienna], p. 86–94.

Rosenkranz, Friedrich: **Das Phänoklima von Wien,** [The phenological climate of Vienna], p. 95–98.

Lauscher, Friedrich: **Flachland- und Hügelklima im Gebiet von Wien,** [Plains and hill climate in the region of Vienna], p. 99–102.

Tschermak, Leo: **Die natürliche Holzartenverbreitung im Umkreis von Wien in ihrer Abhängigkeit vom Klima,** [The natural distribution of tree types in the neighborhood of Vienna as dependent on climate], p. 103–108.

Dirmhirn, Inge: **Der Einfluss der Windrichtung auf die Globalstrahlung auf der Hohen Warte,** [The influence of wind direction on global radiation at the Hohe Warte], p. 109–113.

Eckel, O.: **Die Temperatur des wiener Trinkwassers,** [The temperature of Vienna drinking water], p. 113–115.

Sauberer, Adele: **Die Verteilung rindenbewohnender Flechten in Wien, ein bioklimatisches Grosstadtproblem,** [The distribution of bark-dwelling lichens in Vienna, a bioclimatic urban problem], p. 116–121.

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